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features in this issue...

The Veterinarian and Poultry Practice

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Radiological Hazards due to Low-Energy Radiation

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*U.S. Patent No. 2,772,167
[1]J. of Nutrition, 53:1, May, 1954.
[2]Armour Research Foundation Report Project No. C616.
[3]Jensen-Salsbery Research Data: In press.

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Reprint from the JOURNAL of the American Veterinary Medical Association, vol. 124, No. 922, Jan., 1954, pp. 19-20.

A Note on the Use of Surital Sodium Anesthesia in Swine

H. W. DUNNE, D.V.M., Ph.D., and Captain S. C. BENBROOK, V.C., U.S. Army

East Lansing, Michigan

THE NEED for a satisfactory anesthetic in swine practice has long been recognized by veterinary surgeons and research workers throughout the nation. Until recently, most of the anesthetics available seemed to be contraindicated in some phase of application. They proved to be either toxic, resulting in frequent deaths, or the duration of anesthesia was too long and incurred time-consuming attention following an operation. Floundering and struggling associated with recovery from anesthesia of

Use of Surital Sodium and Curare in Small-Animal Surgery

W. O. Brinker, D.V.M., M.S.
Michigan State College
East Lansing, Mich.

Reprint, The North American Veterinarian, Vol. 32. December, 1951.

Surital Sodium Anesthesia in Canine Surgery

H. B. ROBERTS, D.V.M.; W. E. WENDT, D.V.M.; C. C. WAGNER, D.V.M., M.Sc.; T. F. REUTNER, D.V.M., M.S.

Reprint from the JOURNAL of the American Veterinary Medical Association, Vol. CXVIII, No. 888, March, 1951, pp. 191-194.

Reprinted from VETERINARY MEDICINE, Vol. XLVII, No. 3, March 1952

Surital Sodium And Morphine Anesthe In Canine Surgery

W. C. YOUNG, JR.,* D.V.M. and F. E. EADS D.V.M., M.S., Detroit, Michi

THE use of surital** sodium (sodium 5-allyl-5-(1-methylbutyl)-2-thiobarbiturate), a recently developed ultra-short acting thiobarbiturate, has been reported by several workers. It could be called the thiopentalogue of seconal** just as pentothal** sodium could be considered the thiopentalogue of nembutal**.

In most instances, intravenously. Howe Dillon and Denoni administration in ve in this manner has nary medicine.

In five experim

Reprint from the JOURNAL of the American Veterinary Medical Association, Vol. 122, No. 912, Mar., 1953.

Dosage Studies of Surital Sodium in Dogs

ROBERT F. BORGMAN D.V.M., M.S.

Asheville, North Carolina

RECENTLY, a new thiobarbiturate, surital sodium, has been offered for limited clinical trial. Clinical reports have shown surital sodium to be an excellent anesthetic for operations of short duration in dogs. Its anesthesia is smooth and relatively free from excitement and irritability.** When injected intravenously at hourly intervals.

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TABLE I—Results of Surital So

Reprinted from VETERINARY MEDICINE, Vol. L, No. 8, p. 365, August 19

Intrathoracic Anesthesia In Cats

MARK STERNFELS, D.V.M., Mount Vernon, New York

WHEN a human patient is suffering from an ailment which calls for surgical interference, laboratory technics are employed to aid in the diagnosis. Preoperative injections of dextrose and saline solutions are given to raise blood sugar levels for prevention of shock and dehydration.

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Surgery performed under anesth by intrathoracic administration included: Teeth cleaning and e trimming and removal of injure pyometra, removal of cysts, pu abscesses, castration, cesarea treatments, castration cases, p accident cases, fracture, and for x-ray diagnc

Surital Sodium, A New Anesthetic and Hypnotic

Studies in Dogs

T. F. REUTNER, D.V.M., M.S., and O. M. GRUHZIT, M.S., M.D.

Detroit, Michigan

Reprint from the Journal of the American Veterinary Medical Association, Vol. CXIII, No. 838, October, 1948, pp. 257-260.

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F. E. EADS, D.V.M., M.S., *Detroit, Mich.*

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covery. They estimate that the approximately 1.5 times that of the dog. Similar results were Kelly, et al.14 Surital accur slowly in dogs than does pen there appears to be less satura toxification mechanisms whe

(*Reprinted from* THE CALIFORNIA VETERINARIAN, Sept.-Oct., 1953)

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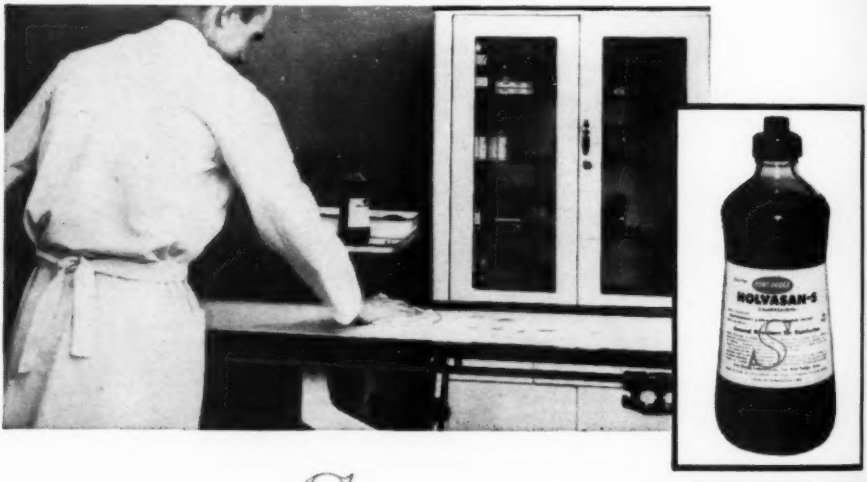

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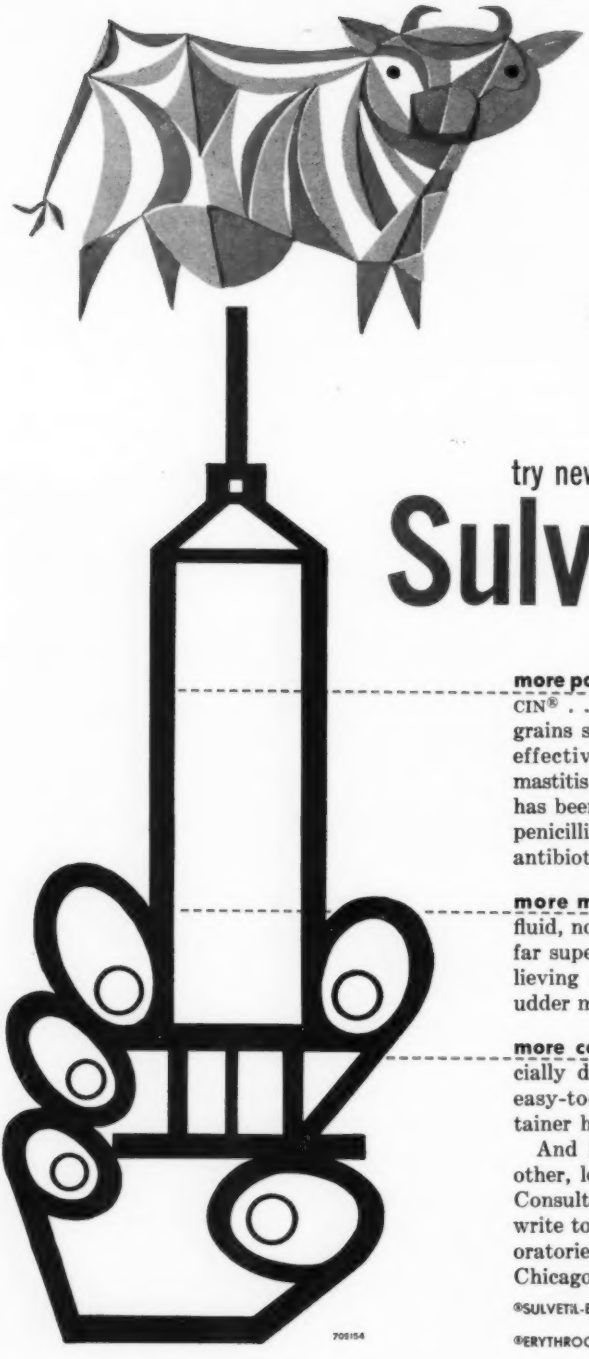

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NEWS COMMENT

Penicillin in Milk

There should never have been a penicillin-in-milk problem. But for unscrupulous or at least unthinking dairymen, the matter of penicillin-in-milk would not have become a national scandal having public health significance.

Now it is up to the dairy industry to clean up the mess so that consumers can again have confidence in a safe, unadulterated fresh milk supply. Watering milk or adding milk from recently treated cows to the supply are both adulteration practices, and are equally undesirable. Yet dairymen who would consider adding water to milk as unthinkable have added milk to the supply from a cow that has received a massive dose of penicillin the day before. Their rationale makes use of the fact that it looks all right in the bucket.

The pencillin-in-milk problem should never have happened. It need not have developed to nightmarish proportions for the cheesemaker or become of vital concern to public health officials.

The dairy industry is being given the opportunity to clean up its own house. Necessary requirements to do so are simple and clear. It also appears inevitable that unless producers of market milk keep measurable pencillin (or other antibiotics and drugs) out of the supply, enforcement steps will be taken.

Seriousness of the problem has been made clear. Assuming that conscientious producers are conforming to recommended practices (withholding milk from treated cows for at least 72 hours) the tolerated flagrant violations of the rule by a few is likely to penalize all.

▼ ▼ ▼

Postal Rate Increases

Double-entry figure juggling made the news again last month when Olin D. Johnston (Dem., So. Car.) of the Senate Post Office Committee introduced a bill that would include Post Office contributions to the Civil Service retirement fund as department costs for the purpose of establishing postal rates. This maneuver in bookkeeping will add more weight to the mounting paper deficit, and provide what may appear to be a plausable argument for postal rate hikes.

The U. S. Chamber of Commerce nailed the facts to the Post Office door with this statement: "The administration has sent a bill to Congress to help lay the groundwork for increasing postal rates."

VETERINARY Medicine

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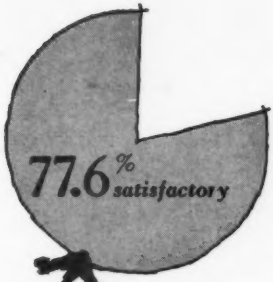

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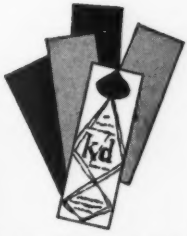

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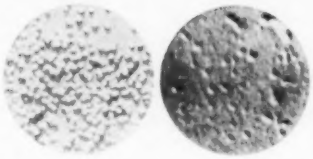

RABIES: (*left*) electron micrograph of rabies virus. X 40,000.

DISTEMPER: (*right*) electron micrograph of distemper virus. X 144,000.

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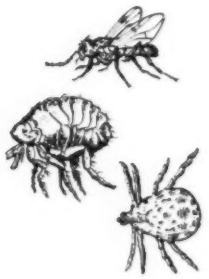

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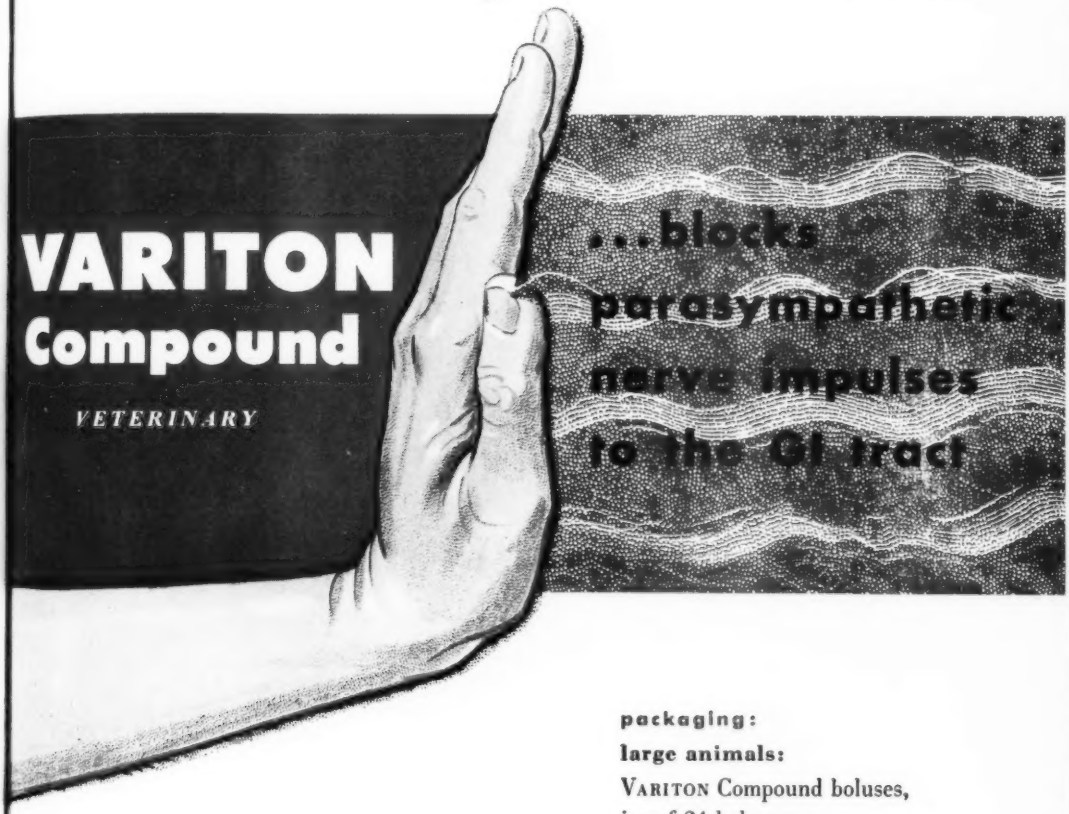

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*Jones, S. V.; Belloff, G. B., and Roberts, H. D. B.: Vet. Med. 51:413 (Sept.) 1956.

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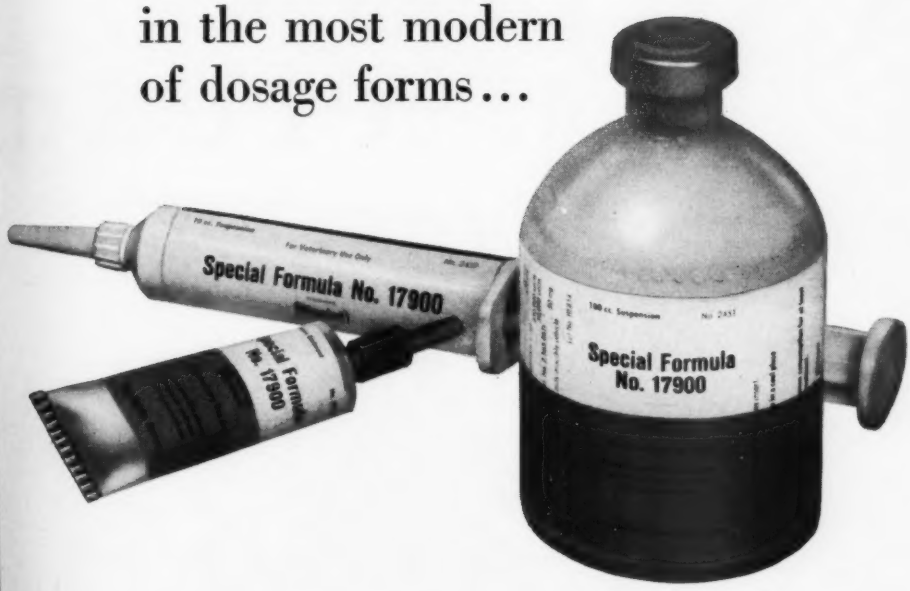

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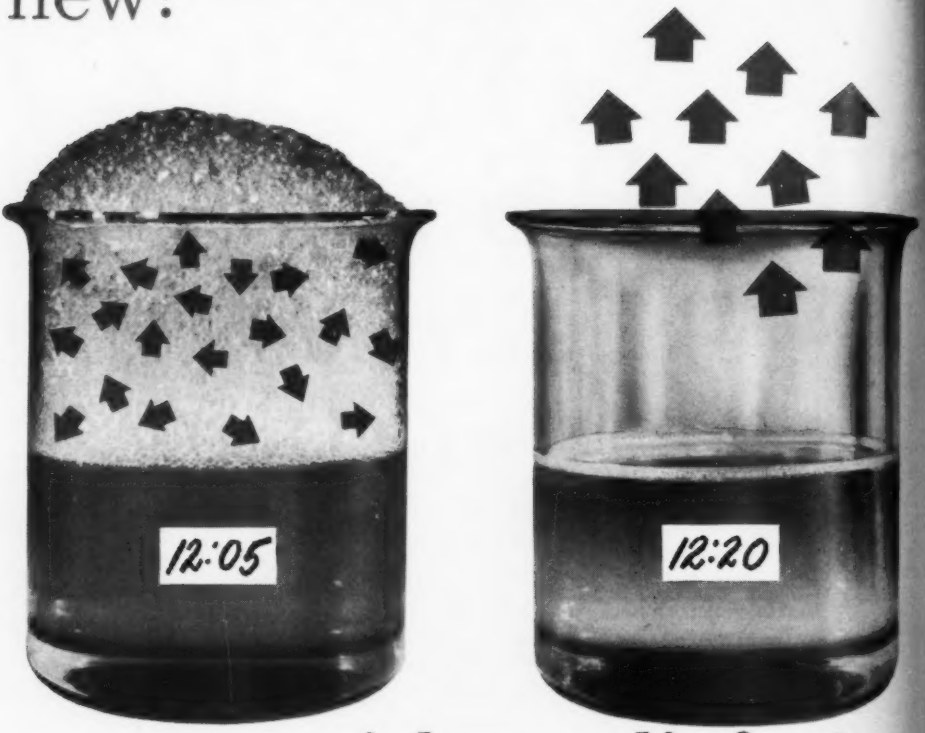

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REFERENCES: 1. Mosier, J. E.: Vet. M. 50:605 (Nov.) 1955.
2. Belloff, G. B.: Calif. Vet. 9:27 (Sept.-Oct.) 1956.
3. Pollock, S.: J. Am. Vet. M. Ass. 129:274 (Sept.) 1956.

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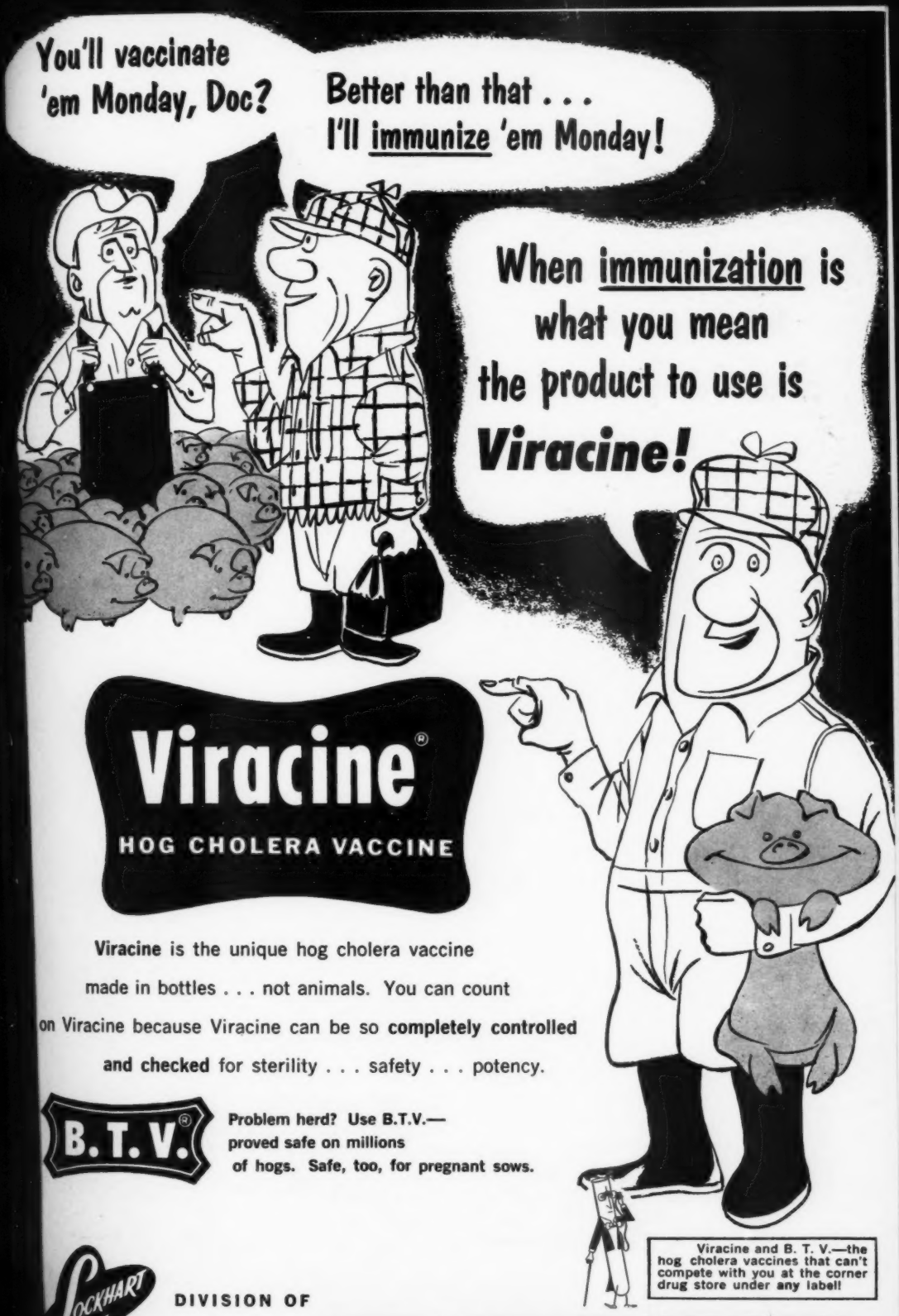
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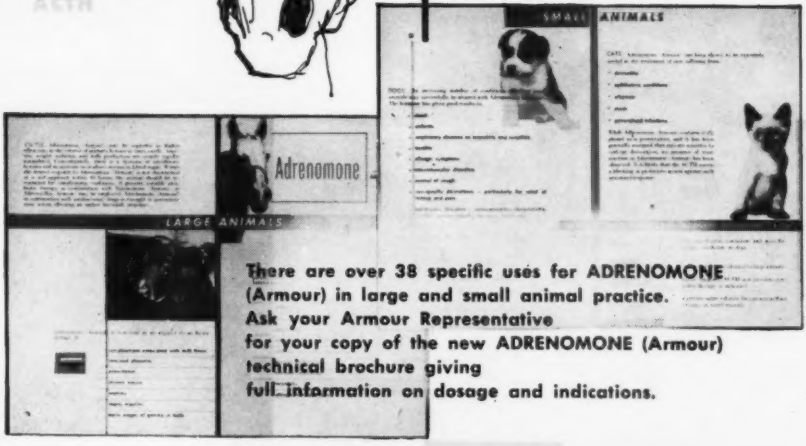

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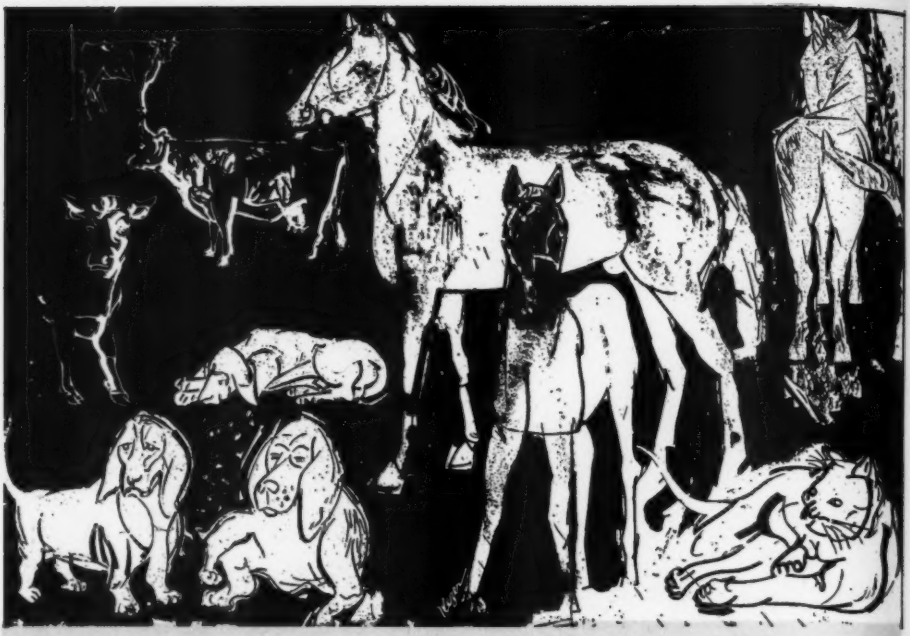

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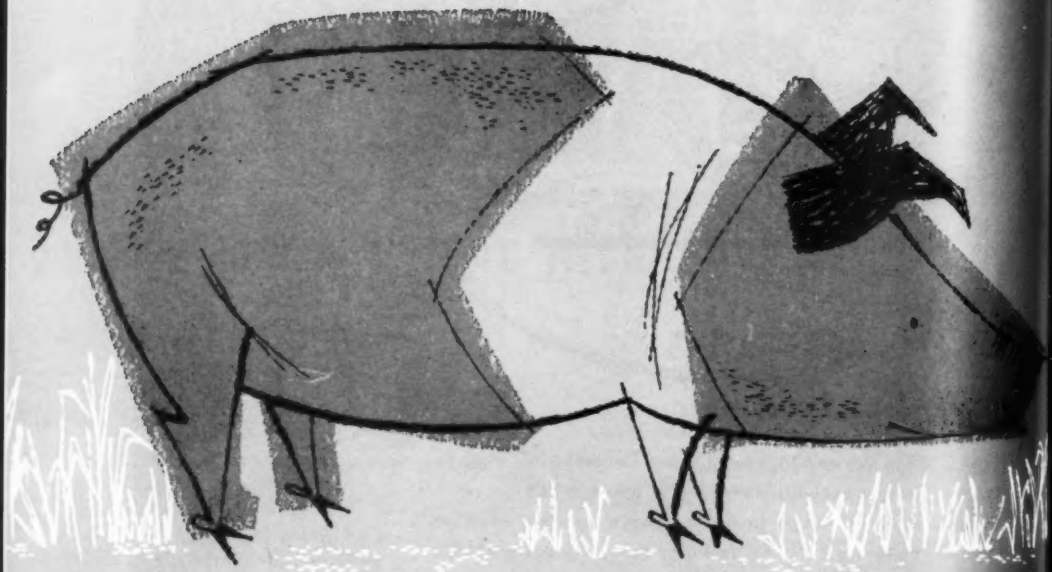

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The Veterinarian And Poultry Practice

L. M. SKAMSER,* B.S., D.V.M., New York, New York

Reluctance of veterinarians to participate in combating disease problems among poultry flocks has been eliminated largely. This occurred when the poultry industry invited professional consideration of costly disease problems among broilers, layers, and brooding chicks. More and more practitioners report favorable financial returns on service to flock owners and satisfaction with efforts to properly equip themselves to serve this specialized field.

Students are now given thorough training in poultry pathology which fact emphasizes the growing scope of veterinary medicine, opportunities for service to a food producing industry, besides assuring a continuous supply of high quality protein food and a profitable future for growers.

THERE are definite opportunities in the poultry industry for the practicing veterinarian. Some personal experiences in poultry practice will best point out the possibilities.

In the early part of 1943, I settled in a small town in Minnesota to start a large animal practice. I had no intention of even looking at either chickens or turkeys, and did not try to encourage this type of practice. However, I soon found that I had settled in a farming district that did contain a number of large turkey flocks as well as substantial numbers of laying hens; and it appeared that perhaps I could augment my income by doing some poultry work.

In 1944, I learned that a large turkey farm in the area was having considerable trouble with their poults, and, having a speaking acquaintance with the owner, I asked him if I might work with some of the turkeys to see if I could help. He agreed that I could treat 600 poults to see if my methods would be better than those he had previously been receiving from a remedy-house salesman. Armed with Biester's book on poultry diseases and meager knowledge gained in a course in veterinary school on poultry pathology, I plunged in.

I examined the birds and realized that I could not make a diagnosis. I then took some birds to the University of Minnesota where a diagnosis of paratyphoid infection was made. I now had a diagnosis, but was informed by the pathologist at the University that there was absolutely no treatment for paratyphoid in turkeys. I purchased a bottle of baby vitamins and an eye dropper, and administered several drops of the vitamins to each poult. Then I dispensed several pails of clovite® to be used to fortify the diet. Luckily, these birds responded well to treatment and, several weeks later, the birds I had treated looked considerably better than those which had been treated in the routine manner. Encouraged by my success, I proceeded to set up facilities whereby I could handle postmortem examinations on turkeys and chickens. After several years, I found that approximately 25% of my net income was gained from the diagnostic service which I was rendering, in addition to income produced by the products I dispensed.

What is the Poultry Industry?

The poultry industry is a specialized business — or, at least, it is becoming a specialized

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Fig. 1. Preliminary to collection of sterile blood sample, feathers are plucked from the beast and a quarternary ammonuim solution poured over the area. Breast is then washed with cotton saturated in the antiseptic solution. Sterilize by autoclaving syringes and needles.

business. A transformation in methods of management, nutrition, disease control, and size of flocks is taking place. The number of birds raised is increasing, and flocks are becoming larger to achieve greater efficiency of operation, resulting in a saving in labor per unit raised. In the year 1957, the broiler industry expects to market 1,240,000,000 birds at a gross income of $850,000,000. Those who specialize in the production of eggs will raise 500,000,000 pullets, and will keep 350,000,000 pullets on their farms for egg production. This segment of the industry expects a gross income of $1,750,000,000. The turkey industry is by no means small either, because they expect to market 70,000,000 turkeys at a gross income of $350,000,000. These three segments — broilers, layers, and turkeys, will produce a combined gross income of $3,000,000,000., as compared with a gross income of $2,500,000,000. for the hog industry. There are probably 2,000 veterinarians in the United States who depend upon the hog industry for a large part of their income. It is evident that the poultry industry, too, is capable of producing considerable income for the veterinary profession.

Annually, the poultry industry consumes a minimum of $45,000,000. worth, at wholesale figures, of packaged drugs and biologicals. This is six times more than the drugs and biologicals used in the small animal field, and is equal to the total combined drug and biological consumption by the swine and cattle industries. In addition, millions of tons of feed containing antibiotics and coccidiostats are used by the poultry industry.

The Role of the Veterinarian

These figures should interest you and make you wonder just where the veterinarian fits into this picture. Over the past 12 years, the demand for veterinary service by the poultry industry has increased considerably, principally because poultry disease diagnosis has become more complex. As the industry itself expanded, disease problems have increased and expanded. As an illustration, when I first started diagnostic work in the poultry field, there was one respiratory disease which was called brooder pneumonia. Newcastle disease and chronic respiratory disease were unknown. Brooder pneumonia is really infectious bronchitis, but it was a disease of little consequence in those days. A little guaiacol for the drinking water was dispensed and no problem developed. But, in 1947 Newcastle disease occurred. It spread like a prairie fire all over the United States and literally millions of birds were affected and died. Local diagnostic laboratories were unable to diagnose this new disease by serologic methods, and specimens and samples had to be sent to Washington, D. C.; usually, two months elapsed before a positive serologic diagnosis could be expected. Basically, the poultry industry has a need, which they often have not recognized, for competent local veterinary service.

It has been stated frequently that the veterinary profession is not interested in poultry work. However, the remarkable contributions made by veterinarians in the control of poultry

diseases through research and diagnostic work contradict that statement. I personally know of 200 veterinarians employed by state, federal, and commercial interests who are engaged in full-time employment on poultry disease problems. I do not know how many general practitioners in the country offer diagnostic service to the poultry industry, but I do know that 82 veterinarians in Iowa do offer such laboratory service. Veterinarians in many other areas are becoming increasingly conscious of the possibilities of poultry diagnostic service. Also, in recent years, poultry short course meetings for veterinarians have been held in many of the midwestern states.

In many parts of the country, the demand for diagnostic service has been met to a large degree by the establishment of state-supported laboratories, which have been expanding rapidly, especially since the war. Disease research under the direction of veterinarians has also been expanding rapidly — in fact, as quickly as funds have become available to pay for the services rendered by the research man. However, at the local level, sometimes there appears to be a lack of understanding between the poultryman and the veterinarian, because the veterinarian has not offered a service to the poultry industry, and the poultry industry has been unwilling to pay an adequate fee when service was offered. This situation can be easily remedied if the veterinarian will take the initiative.

Veterinary Diagnostic Service

Some general suggestions can be made for development of diagnostic service at the local level. The details, of course, will vary according to the individual, and the location and extent of the practice. The establishment of facilities for laboratory diagnosis means that poultry practice will be introduced into veterinary medicine. As a profession, we must show the poultry industry how veterinary medicine, especially preventive medicine, can benefit the poultryman.

Qualifications of a Poultry Diagnostician

To make a diagnosis, certain qualifications are necessary. One should have knowledge of bacteriology and its procedures; a knowledge of viruses, and the ways in which viruses spread and cause disease; ability to recognize pathology and interpret the lesions which are seen; knowledge of organized methods of arriving at a diagnosis; and knowledge of the application of treatments. In this list of qualifications, there is not one single area in which the veterinarian is deficient — in fact, it is doubtful if there is anyone who has these qualifications in greater abundance than the veterinarian. In addition, satisfactory application of the knowledge we already possess to the specific field of diagnosis of poultry diseases will necessitate familiarity with and understanding of poultry management and housing, poultry nutrition, and knowledge of specific poultry diseases. Competence in these three fields will mean the difference between success and failure if one is to conduct a poultry diagnostic laboratory. Fortunately, there is abundant organized information available on these subjects. Actually, it is the easiest part of the knowledge which must be acquired, because it fits in naturally with much of the information already possessed by the practitioner.

This information is available from textbooks, government pamphlets, drug industry publications, and state-operated, diagnostic laboratories. The one indispensable basic textbook is entitled Diseases of Poultry edited by Biester and Schwarte, and published by the

Fig. 2. With bird held with breast uppermost, insert needle through the V in a downward-backward direction for intracardial puncture and collection of blood sample.

Fig. 3. Dr. L. M. Skamser illustrates method of dipping bird in preparation for autopsy. Quarternary ammonium solution is used. Note that head is held out of solution to avoid danger of errors in interpretation of finding in upper respiratory and digestive tracts.

Iowa State College Press, Ames. All basic information on poultry diseases is contained in this book, even though it is not entirely up-to-date in terms of some of the newer diseases. Government pamphlets can be obtained from the local county agent. Drug-industry publications are available on request and contain excellent, up-to-date information about poultry diseases and products for treatment. The state-operated diagnostic laboratory is the strongest ally in this field, and their services are yours for the asking. In fact, not only will they assist with advice on poultry management and treatment of diseases, but also will, in most instances, permit you to spend time in the laboratory perfecting diagnostic technics.

Policy for Operation of Service

There are two approaches to the problem of a policy for operation of a poultry diagnostic service:

1. Charge for a diagnosis, and recommend treatments, changes of management or changes in nutrition involved; visit the farm when necessary, and charge a fee for this service.

2. Make a diagnosis for which no charge is made, and depend upon sales of drugs for the revenue to support the practice.

There are veterinarians who operate under both systems, and it is my opinion that the no-charge system for diagnostic service and dependence upon drug sales for revenue is a trap to be avoided. The veterinarian has a distinct advantage in the field of diagnosis, and has no competition except from unqualified persons. However, other agencies do sell drugs and biologicals to the poultry industry, often at a very small net profit. In any event, dispensing by the veterinarian in the poultry field should be governed by the area and conditions present. Inquiry about other outlets for poultry products will soon indicate what path should be followed. If competition in your area is not great, additional profits can be made by dispensing drugs and biologicals. If it appears that a fair profit can not be earned, prescriptions should be written for the products which the poultryman should use. The diagnostic service offered is the most important service rendered and is the key to establishing a successful poultry practice.

Laboratory Procedures

Veterinarians doing any amount of diagnostic work in the poultry field all recognize that symptoms and lesions of disease in poultry are not pathognomonic; therefore, a differential diagnosis is essential. This can be accomplished by establishing a small bacteriologic laboratory to conduct autopsy and culture work. The basic reason for using cultural technics are:

1. To save time and bother of mailing specimens to a central laboratory.

2. More specimens can be examined than it would be feasible to ship.

3. A diagnosis can usually be established more quickly.

4. The veterinarian has the satisfaction of using a greater proportion of his scientific training.

Equipment. Equipment for the isolation and identification of poultry pathogens need not be elaborate or expensive, and the average veterinarian in practice already possesses much of it. A compound microscope with an oil immersion lens is an absolute necessity. An ordinary kitchen pressure cooker can serve as an autoclave for instruments. The oven of a kitchen range can serve as a source of heat to sterilize glassware. These three pieces of equipment can serve in a dual capacity because they are needed for most of the other work ordinarily done. Special equipment includes an incubator for culture of bacteria, which can be purchased from a supply house or can be made from a used refrigerator. In converting refrigerator to incubator, the refrigerating

unit is removed and a thermostatic control unit is installed in the electrical circuit. This thermostat control can be purchased from a hardware store or hatchery using a wafer thermostat which is ordinarily used to control the heat on electric brooder stoves. A 100-watt bulb serves as a source of heat. A hole is drilled through the top of the refrigerator, now an incubator, and a thermometer is installed into the hole to check the inside temperature from the outside. Of course, an ordinary refrigerator will be needed to store blood samples, prepared media, and biologicals.

List of Equipment Needed

1. Petri dishes, 48-90 mm.
2. Media
3. Bunsen burner
4. Wire inoculating loops (2)
5. Test tubes (100)—rack
6. Balance
7. Erlenmeyer flasks, 500 cc. (4)
8. Durham tubes (24)
9. Graduated cylinder 100 cc.
10. Stains: Gentian violet, Grams, iodine, carbol fuchsin, Loeffler's methylene blue
11. Slides and cover slips

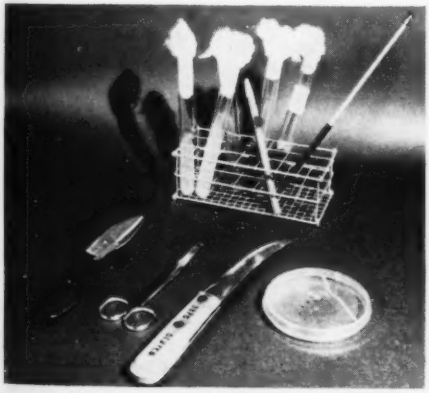

Fig. 4. Equipment for poultry autopsy need be neither elaborate nor extensive.

Some bacteriologists in the poultry field prefer media which are placed in test tubes on a slant, and select their colonies from these slants rather than Petri dishes; according to personal preference, the number of Petri dishes would be reduced, and test tubes used for bacterial inoculation work increased. Instruments needed for poultry work are few; postmortem shears, a searing blade, and several pairs of scissors, one pair to be used for opening intestines should have a blunt point on one side.

Bacteriologic Methods. Media for growing bacteria may be purchased from Difco Laboratories, Detroit, Mich. The material is dehydrated and is prepared by heating and dissolving in distilled water. For routine culturing, three types of solid media, three carbohydrate broths, and one nutrient broth are sufficient.

Types of Media — Difco Manual — Ninth Edition

Solid Media	Carbohydrates	Nutrient Broth
1. Tryptose agar	Phenol red dextrose broth	Nutrient broth
2. SS agar	Phenol red lactose broth	
3. SIM medium	Phenol red saccharose broth (sucrose)	

A wide variety of bacteria will grow on tryptose agar and is used when no selective growth is desired. SS agar is a selective media for growth of Salmonella or Shigella organisms. SIM medium is used to detect indol production, H_2S, and motility in a single tube. Nutrient broth grows selected colonies rapidly before inoculation of carbohydrate broths and SIM medium.

Outline for Culturing Poultry Organisms

1. Inoculate tryptose agar or SS agar if enteric bacteria are suspected.
2. Incubate 24 hours and examine plate to identify cultures.
3. Transfer selected colony or colonies to nutrient broth.
4. Incubate nutrient broth several hours and inoculate SIM medium and carbohydrate broths.
5. Incubate carbohydrate broths and SIM medium for 24 hours.
6. Check carbohydrate broths for acid and gas formation.
7. Check SIM medium for motility and H_2S production.
8. Add a few drops each of chloroform and Kovac's reagent to SIM medium to check for indol production.

The Veterinarian in Poultry Production

Serological Tests. Two serological tests are routinely employed in poultry practice. These are the Salmonella whole blood plate test and

Fig. 5. Postmortem examination. Respiratory organs, mouth and esophagus are examined first (upper). Legs are cut free from body, spread and skin removed over abdomen, then pulled forward to reveal sternum and crop.

the Newcastle disease hemagglutination-inhibition test. To obtain blood samples, the breast of the bird is dipped in quaternary ammonium solution, the bird is placed on its back and an 18 gauge, 2- to 3-in. needle is inserted downward between the V of the breast into the heart. Blood samples are placed in tubes. One drop of fresh, whole blood is then mixed with one drop of polyvalent pullorum antigen. Agglutination indicates the presence of Salmonella antibodies and infection. The blood serum from the sample is used to check for the presence or absence of Newcastle disease antibodies. This test, the HI test, can be performed by your state poultry diagnostic laboratory.

Blood smears may also be prepared from fresh blood and stained with Gram stain, particularly if erysipelas or pasteurellosis in turkeys is suspected. In fact, for all practical purposes, this is the best method for identifying *Erysipelothrix rhusiopathiae*, which is Gram-positive, whereas Pasteurella spp. are Gram-negative. If *Ery. rhusiopathiae* is suspected, it would probably be futile to culture on media because the organism is not easily grown.

Hematocrit readings can be taken with the Wintrobe tube to determine volume of cells. A normal reading of 30 for the red cells, with a relatively narrow, buffy color layer is normal. Lower volume of red cells would indicate anemia or hemorrhagic disease which is now

Fig. 6. Ribs are cut with a strong shears and sternum lifted forward to reveal heart, lungs, liver, gizzard, pancreas, and intestines. After careful study for gross tissue changes, samples may be cut for confirmation by microscopy and inoculation of plates or tubes for bacteriological examination.

prevalent in broiler flocks; whereas, a wide layer of white cells would indicate pullet disease in chickens or bluecomb in turkeys. For explanation of advanced work in hematology, see the *Journal of the American Veterinary Medical Association,* June 1, 1956—Hematology as an aid in the Diagnosis of Poultry Diseases.

Routine Procedure for Diagnosis

It is important to remember that an early diagnosis should be attempted to save time and money for the poultrymen. When specimens are presented, a complete history is important, including symptoms that the owner has observed; death losses; purpose for which the birds are being raised; management — in confinement or on range — housing, etc.; and type of feed offered and relative consumption. It is most important to find out what medication is being administered, in the feed or otherwise. If birds are on a high-level antibiotic diet (approximately 200 gm. or more of antibiotic per ton) it will be extremely difficult to culture bacterial pathogens.

Preliminary examination of sick birds and postmortem examination of one or two dead birds may give the answer to the problem. External symptoms may give the clue in respiratory diseases such as fowl pox or laryngotracheitis. In addition, external parasites of which the owner may be unaware can be easily observed. This should be done before the next bird is destroyed for autopsy since blood samples are best obtained before the bird is sacrificed. Tests for Newcastle disease and Salmonella are then made and, of course, blood smears can be prepared. If it is still impossible to make a diagnosis after postmortem, cultural methods for bacterial isolations should be carried out.

In all cases where a management difficulty might be suspected, it is well to recommend a visit to the farm. Often the cause of the trouble is right on the farm in the management of the flock, and no amount of questioning, culture work or postmortem examination will reveal the answer.

Actual calls or visits to the farm are important because this is a service that no other agency presently doing diagnostic work is in a position to offer. Extensive state facilities for culturing chickens and turkeys, as well as extensive serologic equipment, are available, but this does not compensate for the inability of poultry pathologists to make farm visits. This is not a criticism of the service these men offer, but is pointed out to indicate that the local veterinarian is in the best position possible to really help the poultry industry.

Developing a Poultry Practice

Activities in this field must be governed by local custom; methods must be designed to fit each particular situation. Professional announcements of your ability to offer diagnostic service should be made. In many small communities, the local newspaper would probably like to print a story with pictures to show the facilities that have been set up to render a service to the local poultry industry.

A special effort should be made to personally talk to the local county agent and inform him that you are equipped to handle poultry diagnostic work. The county agent

Identification of Bacteria

Organism	Tryptose Agar	SS Agar	Lactose	Sucrose	Dextrose	Sim Indol	Agar H_2S	Motility
Salmonella pullorum		colorless	—	—	AG	—	+	—
Salmonella typhimurium		grayish	—	—	AG	—	+	— +
Shigella gallinarum (Salmonella)		blue gray	—	—	AG	—	+ —	—
Pasteurella multocida	granular	—	—	—	AG	+	+	—
Escherichia coli		red	AG	—	AG	+	—	+ —
Proteus spp.		discrete colonies	—	+ —	AG	—	+	+
Pseudomonas aeruginosa		viscid	—	—	—	—	—	+

A—Acid Production. G—Gas Formation.

receives many requests for help regarding poultry disease work and he would probably be happy to refer these questions to you, particularly since he has had little formal training on such subjects.

The local drug store is in about the same predicament as the county agent. They may have poultry remedies on the shelf, but they may not know what they are for or how to use them. Again, the local druggist would be happy to refer poultry problems to you.

Local feed companies and their salesmen can serve as important sources of poultry diagnostic work. It is not unusual for feed-company representatives to take specimens to diagnostic laboratories to find out, if possible, what is wrong with a flock. At the present time, the feed companies and their salesmen are doing considerable poultry-service work which is taking up their time and costing them money. Of course, they sell drugs, but the profit made from drugs does not compensate for the loss of the salesman's time. Basically, the feed company is set up to sell feed and its profit is determined by the numbers of tons sold. Therefore, every time the salesman is tied up for a half day, servicing an account because of some difficulty, for which absolutely no compensation is received, they are losing the services of this salesman for the work he has been hired to do. A working agreement with the feed companies can be set up which would be mutually beneficial to both the veterinarian and the feed company. Probably his present clients are a veterinarian's greatest asset. As they are contacted in your daily work, mention the fact that you are equipped to handle their poultry problems. Tell them that you have laboratory facilities which will make it possible for you, in most instances, to give them a rapid diagnosis and to prevent extensive losses before disease has a chance to get started.

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Brucella Infection in Goats

No organized program for the control or eradication of brucellosis in goats exists in this country, consequently records of testing this species are limited. Compulsory testing of goats ought to supplement the cattle brucellosis eradication program to eliminate *B. melitensis* infection throughout the country.

That the proportion of caprine infection is less than serious is evident from results obtained during fiscal year 1956 when 13,368 goats in 2,406 herds were tested on an optional basis. Infection rate disclosed was approximately 0.5%.

Thyroprotein for Sows

Feeding iodinated casein (thyroprotein) to gilts and sows at farrowing and during early lactation is subject of experiments at Iowa State College. Study was undertaken in an effort to overcome the common problem of poor milk flow in early lactation. Dr. Damon Catron and associates report results and observation concerning the addition of the hormone to rations in Iowa Farm Science as a progress report.

In a limited series of tests, a level of 100 mg. of iodinated casein per lb. of feed (200 gm. per ton) was found to be optimum. One-half this amount failed to produce gains in pigs and double the recommended level appeared to have adverse effect on the sow's heart and respiratory rates. To date hormone supplementation has been started three or four days before farrowing and continued only two weeks after farrowing. What influence continued use of this supplement would have is at the moment a matter for conjecture. Further studies are in progress.

Controlled experiments indicated a significant early gain in pigs and numbers of living pigs at weaning; plus average of 13.6% gain during the first two weeks for those nursing hormone fed sows over control, or a corrected 22.8% litter gain during first two weeks of life.

Summarizing the Iowa report, *Feedstuffs* for March 9, 1957 quotes Doctor Catron "that iodinated casein feeding seems likely to be practical for swine producers who wean pigs early — from two to four weeks of age."

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Piperazine Derivatives

Though not a new chemical formulation, piperazine was discovered to be effective as an anthelmintic in the treatment of roundworms in poultry (see *Vet. Med.*, 50:444 [Oct.], 1955) and swine about two years ago. Prior to this, it had only limited use as a chemical intermediate.

Fiperazine derivatives have also been found useful in the treatment of filarial infections. It also provides a starting point for the preparation of certain types of antihistamines, antimalarials, and effective therapeutics for the treatment of arthritis and rheumatism. Recently a number of anesthetics, analgesics, sedatives, and hormone compositions based on piperazine have been reported. In other fields, various derivatives have been proposed for use as rubber accelerators and stabilizers, surface active agents, resins, and polymers.

Toxicological Studies Following Massive Dose Of Phenothiazine To A Calf

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and B. F. HIGGS,* Fort Worth, Texas

VETERINARY literature contains numerous references to the use of larger than normal doses of phenothiazine in order to study certain aspects of the chemical. For example, Cauthen[1] gave 100-gm. doses of the drug on each of three successive days to calves four to twelve months of age. He also gave 250 gm. as a single dose to another animal.

This report contains clinical observations together with data on blood analysis, fecal, and urine analysis and weight changes following administration of 436.5 gm. phenothiazine N.F. purified to a calf weighing 268 lb., or at a dose rate of 162.68 gm. per 100 lb.

Materials and Methods

The animal (fig. 1) selected for test was in poor physical condition; its hair coat was long, rough, and dry; visible membranes were anemic. It weighed 111 lb. at time of purchase (Nov. 8, 1954). Egg count was 1,100 per gram feces. Feeding schedule had been rather constant for some months prior to the test; rations consisting of prairie hay, small amounts of alfalfa hay, and 2 to 3 lb. grain mixture daily.

On the afternoon of June 21, 1955 the animal weighed 268 lb. Its age was estimated to be ten months. It was put in a stanchion test stall and given 30 oz. of grain, 2½ lb. alfalfa and 2½ lb. prairie hay. At 9:10 a.m. June 22, 1955, 436.5 gm. phenothiazine (N.F. purified) was administered in a bentonite suspension containing 10 gm. of the drug per ounce. A sample of blood from the jugular vein was drawn approximately 30 minutes prior to treatment. All fecal and urinary excreta were collected and analyzed for phenothiazine content by a colorimetric procedure developed by one of the writers (F.N.B.).

Observations

First 24 Hours. For about four hours, the calf remained normal clinically. It continued to eat, drink, and was alert. Then indications of drowsiness were observed. Rectal temperature was 101.4 F. At 7½ hours, another blood sample was taken. At seven hours 50 minutes, the calf exhibited incoordinated movement. At eight hours 25 minutes, it collapsed suddenly in the stall. On three occasions, namely, at 9, 10½, and 12½ hours post-treatment, clonic spasms developed which lasted from about three to five minutes. For the remainder of the first 24-hour period, the animal remained recumbent, highly depressed, and semi-comatose. Highest rectal temperature recorded during this first day was 103 F. which occurred at the ninth hour. Four fecal, six urine, and two blood samples were collected.

Period 24 to 48 Hours. At 25½ hours, the calf gave the first indications of a favorable change. At this time it made feeble attempts to rise, and turned itself from right to left recumbent positions. Rectal temperature was 100.8 F.

At 28¾ hours, it was lifted to its feet but was unable to stand. It drank eight to ten swallows of water at this time. It was able to hold its head normally, and this was the first water consumed since collapse at about the ninth hour post-treatment. Also, at the 29th hour, the animal began rumination for the first time since nine hours post-treatment. At 39 and 41½ hours, it was able to arise and stand without assistance.

Definite improvement occurred between the 25th and the 48th hour. During this period, it drank and ate limited quantities of water and hay. However, urine and fecal passages were induced by massage. Temperature of the animal varied from 100.8 to 102.2 F. Two samples of blood, four of urine, and four of fecal passages were collected during this period.

Period 48 to 72 Hours. Observation during a part of this period led us to believe that the

*Dr. R. I. Rogers, Fred N. Brooks, and B. F. Higgs, Pro-Brand Products Company, a division of Texas Phenothiazine Company.
Acknowledgement is made to Drs. Dan J. Anderson and Jack W. Heaton, Haltom City Animal Hospital, Fort Worth, Tex., for their valuable assistance in this test.

animal would continue to improve. It continued to eat and drink sparingly and ruminated on several occasions. It was assisted to its feet two or three times and stood alone for short periods. On one occasion it arose of its own accord and stood for nearly an hour. Rectal temperature during this period varied from 101.4 to 102.6 F. Fresh hay, grain, and water were offered at the 69th hour, but the calf refused to eat or drink. This was the beginning of a period of regression. Four fecal and eight urine passages were collected during this period.

Period 72 to 96 Hours. The animal continued to weaken during this 24-hour period. It refused all feed except on one or two occasions when the quantity consumed was insignificant. It drank only small quantities of water. Rectal temperatures varied from 101.6 to 102.4 F. It remained recumbent most of the time. When assisted it was unwilling or unable to stand. It did arise, however, on one occasion without help and once with slight assistance. It seemed to be in somewhat of a "dazed" condition; acting as if intoxicated. Six fecal and six urine samples were collected.

Period 96 to 120 Hours. During the latter part of the third 24-hour period and all of the fourth 24-hour period, there had been a decline in general condition as compared to the second period and first part of the third period. During the period of decline motility of the entire alimentary tract appeared to be feeble or extremely sluggish judged by the scant, dry feces.

In review, symptoms during the first 48 hours were quite different from those of the 60th to 96th hours. Delayed symptoms were suggestive of gastrointestinal intoxication. It was, therefore, concluded that supportive treatment should be given. At 10:20 a.m. June 26, 1955 or 97½ hours post-treatment the following treatment was given: 250 cc. 5% dextrose, 250 cc. normal saline, 3 cc. intraheptol and 3 cc. injectable vitamin B complex intravenously; 2 cc. of water soluble glyceride of cascara intramuscularly; and 4 oz. of a solution containing 5% dextrose in normal saline orally and rectally repeated every two hours.

The animal had arisen at 9:30 a.m. It remained standing during treatment and for an additional 1½ hours. Within an hour, the calf ate a little prairie hay and drank small amounts of water. It ruminated for about 15 minutes. This 24-hour period was characterized by a slight response to the treatment. The animal arose several times unassisted and consumed slightly more feed. Some alleviation of symptoms of intoxication was noted but the weakened condition persisted. Temperature varied from 101.6 to 103.1 F. Urination increased in frequency. However, it was necessary to induce passage of feces since there was only a slight increase in moisture content. Sixteen urine and five fecal specimens were collected during this 24-hour period.

Period 120 to 144 Hours. At 122 hours 35 minutes post-treatment the animal arose unassisted at which time the supportive regimen already described with the exception of intraheptol, was repeated. The animal remained standing 40 minutes. One tablespoonful of dry, concentrated rumen inoculant was given in the oral administration of 4 oz. dextrose and normal saline. During this period little grain was consumed, but there was an increased intake of water, alfalfa, and prairie hay. Feces

Fig. 1. Calf prior to administration of phenothiazine.

Fig. 2. Illustrating favorable growth after termination of test. Post-treatment rations were the same as those pretreatment, except amount consumed.

remained hard and dry, and passage was induced by rectal massage. Body temperature varied from 101.4 to 102.4 F. An improvement in the general condition was noted. Five fecal and 14 urine collections were made.

Period 144 to 168 Hours. Although by this time (9 a.m. June 28), general condition was improved, recovery was not as rapid as had been anticipated. Because of evidence[2] that phenothiazine may be bactericidal or bacteriostatic to certain microorganisms, and inasmuch as this animal had received a large quantity of the chemical, further consideration was given to the microflora of the rumen.

It has been observed by other investigators[3] that a fresh inoculant may have certain advantages, and because we were doubtful that inoculation had been successful, another attempt was made. A one gallon composite sample of rumen ingesta was secured from six animals at a nearby slaughter house and 24 oz. of strained liquid was administered as a drench within 30 minutes after collection. This inoculation was made at 11 a.m., or 146 hours post-treatment. At 11:40 a.m., 4 oz. of the 5% dextrose and saline solution was given orally and *via* rectum. At 11:45 a.m., the animal was eating hay with considerable appetite. At 1:45 p.m., 30 oz. of 1.33% acetic acid solution was given orally. At 3 p.m., an induced fecal passage was secured. It is significant to note that this sample was softer and of more normal consistency than any since the first 24-hour period. At 4:10 p.m., apparently normal rumination began. After rumination ceased at 4:35 p.m., it was observed that saliva production was abundant as evidenced by slobbering and repeated swallowing. At 6 p.m., fresh alfalfa hay, prairie hay, and grain feed were offered. During the night, 2 lb. prairie

TABLE 1. Blood Analysis

Sample	RBC	HB	WBC	Segs.	Lymphs.	Stabs.	Morph.	Eosins.	Plasma Hemoglobin %
Pretreatment Sample no. 801823	5,900,000	8.4 gm.	9,000	31	67	1		1	0.17 gm.
7 hr. & 35 minutes post-treatment Sample no. 801879	6,000,000	9.3 gm.	10,800	43	57				0.08 gm.
23 hr. post-treatment Sample no. 801889	6,300,000	9.3 gm.	9,000	45	53	2			0.06 gm.
30 hr. post treatment Sample no. 801966	6,000,000	9.0 gm.	9,500	48	52				0.06 gm.
47.8 hr. post-treatment Sample no. 801975	6,100,000	9.0 gm.	7,700	33	64	2	RBC appear normal	1	0.3 gm.

Blood analysis by Terrell's Laboratories, Fort Worth, Tex.
Legend: RBC—Red Blood Cells; HB—Hemoglobin; WBC—White Blood Cells; Eosins.—Eosinophils; Segs.—Segmented neutrophils; Lymphs.—lymphocytes; Monos.—monocytes.
Any normal blood elements such as myleocytes, basophils, etc. not shown in this table refers to negative findings.

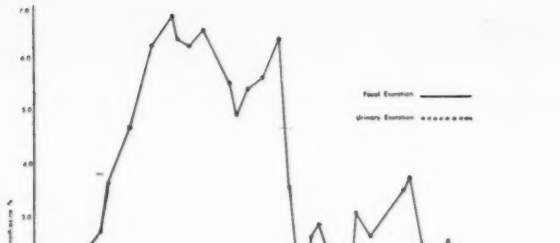

Chart 1. Phenothiazine excretion rate study; 436 gm. dosage.

hay, ½ lb. alfalfa, 1 lb. ground feed, and 1 gal. of water were consumed. During this period four fecal and 19 urine collections were made.

Period 168 to 192 Hours. Such marked and progressive improvement was being exhibited by this time that no further treatment was deemed necessary except for the continuation of dextrose and saline. The first unassisted fecal passage occurred at 10:15 a.m., or the 169th hour post-treatment. During the first eight hours of this period the calf had eaten 1½ lb. of prairie hay, ½ lb. of alfalfa hay. Water consumption increased. Periods of rumination also increased. It was returning to normal, stronger, more alert and showing increasing appetite. Temperature readings were not taken. Six fecal and 18 urine passages were recovered.

Period 192 to 200 Hours. No medication of any kind was given during this period. Appetite was good. The animal remained active and from clinical observations appeared to be recuperating rapidly. Observation continued until 5 p.m. which marked the termination of a 200-hour period. The calf was provided with fresh food and water and left in the test barn without an attendant during the night. From 5 p.m. June 30 to 8 a.m. July 1 it had consumed 3 gal. of water, 4 lb. of prairie hay, and 2 lb. of grain. The calf weighed 235 lb. at 8:30 a.m. July 1, 1955. Thus, 33 lb. were lost during the 215½-hour period. At this point the calf was then turned into a small lot which had been unused for 12 months.

Discussion

Following an excessive dose of phenothiazine, two symptomatic phases were observed. Symptoms developing from the fourth to about the 36th or 48th hour might be termed primary phenothiazine toxicity. During this period the animal exhibited definite reactions to the chemical which subsided about the 24th hour. Therefore, the period covering the first 24 hours post-treatment might be considered the time in which symptoms of primary phenothiazine toxicity could be expected to occur. This time element should be of interest to practitioners because it indicates that symptoms, if they do occur, will probably be observed within this period. If the animal is ambulatory 24 to 48 hours post-treatment a favorable prog-

TABLE 2. Recovery of Phenothiazine in the Feces and Urine

Post-treatment (24-hr. periods)	Grams of Phenothiazine Recovered In Feces	Urine	Total for period	Accumulated recovery	Total to be Recovered
1-24	3.0788	3.8491	6.9279		429.5721
24-48	42.1214	4.8112	46.9326	53.8605	382.6395
48-72	79.1692	10.1226	89.2918	143.1523	293.3477
72-96	71.5818	6.4408	78.0226	221.1749	215.3251
96-120	30.4660	8.6444	39.1104	260.2853	175.2147
120-144	60.2350	6.0179	66.2529	326.5382	109.9618
144-168	28.1741	7.9102	36.0843	362.6225	73.8775
168-192	28.8553	3.9350	32.7903	395.4128	41.0872
192-200	7.8095	1.4459	9.2554	404.6682	31.8318

Total excreted: feces—351.4911 gm.; urine—53.1771 gm.; unrecovered—31.8318 gm.

nosis can be entertained, employing supportive treatment, if necessary. If unfavorable reactions occur after 48 hours post-treatment, it can be seriously questioned that phenothiazine is the direct cause.

Beginning at about the 60th hour post-treatment, a definite decline in condition occured with a different set of symptoms being observed. The reactions noted during this period might be classified as secondary toxicity. In this case, using such a massive dose, manifestations were multiplied to the extent that the symptoms presented were suggestive of those seen in severe gastrointestinal intoxication. All rumen and intestinal movements were at reduced rate. It seems probable that supportive treatment as outlined herein was of definite advantage.

If phenothiazine N.F. purified were capable of producing hemolysis of the red cells in cattle it should have been evident following a dose of such magnitude as described in this report. To gain some knowledge of this possibility, five blood samples were secured. Table 1 shows in detail the results of analysis of these blood samples. To establish normal blood values, a pretreatment sample was taken. Phenothiazine, in this case, did not cause hemolysis or affect the normal blood elements in any manner. Although there was a slight increase in red blood cells and hemoglobin content, these changes were insignificant.

A chart illustrating the manner in which this animal excreted the major portion of the chemical is presented (chart 1). This contains the results of chemical analysis of the feces and urine. It will be noted that phenothiazine was detected in the urine within the first hour post-treatment. The highest concentration of the chemical in the urine, 0.799%, was reached at 55-hours post-treatment. When the test was terminated at 200 hours, the last urinary passage contained 0.064% of the chemical.

Chart 1 indicates that a major portion of the phenothiazine dose was eliminated in the feces. The first fecal passage in which phenothiazine was found occurred between 23 and 24 hours post-treatment and contained approximately 0.5% of the chemical. The percentage increased rather rapidly in subsequent passages until at 55 hours it reached a peak of 6.7% concentration. From this point, percentage decreased to a second peak of 6.2% at the 92nd hour. From this time onward the percentage of the chemical in the feces decreased rapidly, with some fluctuations, due in part to the supportive treatment. When sampling was discontinued at 200 hours post-treatment the last fecal sample contained 0.287% phenothiazine.

TABLE 3. Record of Weight Gain

Date	Weight (lb.)	Gain for period	Days in period	Average daily gain (lb.)
First Period				
Nov. 8, 1954	111			
Jun. 21, 1955	268			
Total		157	227	.69
*Jun. 22 to Jul. 1, 1955				
Second Period				
Jul. 1, 1955	235			
Aug. 17, 1955	310			
Sept. 23, 1955	368			
Oct. 14, 1955	421			
Dec. 21, 1955	546			
Jan. 11, 1956	578			
Jan. 26, 1956	606.5			
Total		371.5	210	1.76
Third Period				
Jan. 26, 1956	606.5			
Mar. 19, 1956	736			
Mar. 26, 1956	757			
Apr. 2, 1956	769			
Apr. 9, 1956	784			
Apr. 16, 1956	818			
Apr. 23, 1956	836			
Jun. 7, 1956	925			
Total		318.5	133	2.39

*Test period in which animal lost 33 lb.

It is interesting to note that the greatest percentages of phenothiazine in both the feces and urine occurred at 55 hours post-treatment. Table 2 shows the amount of the chemical recovered in each 24-hour period. Data from this table indicate a recovery from the feces of 351.4911gm. of the chemical and from the urine 53.1771 gm. Total recovery was 92.71%, or 404.6682 gm. from the original dose of 436.5 gm. Had the test extended for a greater period an even higher percentage of recovery might have been possible. It is our opinion, however, that the ratio of recovery from the feces as compared to the recovery from the urine in this test was not typical of that observed at normal dosage levels.

That a dose of 436.5 gm. of phenothiazine did not effect permanent damage is indicated by continued favorable recovery and by weight gains as indicated in table 3. This table includes weights of the animal at various intervals during a period of 579 days, from the time of purchase until it was sold. Of possible interest is the fact that from the date of purchase (Nov. 8, 1954) until the afternoon of June 21, 1955 just prior to the test described, the calf gained only 157 lb. in the 227 day period, an average daily gain of .69 lb. However, in the

following 210-day period from July 1, 1955 (termination of test) until Jan. 26, 1956, it gained 371.5 lb. or an average daily gain of slightly over 1.76 lb. And, in the third period, from Jan. 26 until June 7, 1956 the date on which the animal was sold, it had gained 318.5 lb. in 133 days for an average gain of 2.39 lb. Post-treatment rations were essentially the same as those pretreatment, except in amount consumed. Pictorial evidence of favorable growth is indicated by figure 2 which depicts the animal as it appeared Apr. 23, 1956.

Conclusions

1. The normal dose of phenothiazine for a calf weighing 268 lb. would be 26.8 gm. on the basis of 10 gm. per 100 lb. liveweight or 53.6 gm. on a 20-gm. per 100 lb. basis. In this test, the calf received a total dose of 436.5 gm., or 162.68 gm. per 100 lb. liveweight, sixteen time the normal dose.

2. A dose of 162.68 gm. phenothiazine per 100 lb. liveweight did produce definite reactions but was not lethal.

3. There was established a time or period in which primary symptoms developed and a time in which such symptoms receded. Also observed in this test was a secondary period in which other symptoms were noted.

4. Phenothiazine, in this case, did not significantly alter blood values. No evidence of hemolysis was found in any blood sample.

5. Data are presented on the recovery of phenothiazine from the feces and urine, showing a total recovery of 92.71% of the original dose.

6. No permanent damage resulted as indicated by subsequent weight gains and continued growth.

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Georgia led all states in commercial broiler production during 1956, according to USDA report. Farmers in that state produced 222,780,000 market birds last year, an increase over a record 177,642,000 for 1955. Texas, Arkansas, and North Carolina follow in succeeding order with production figures approaching 100,000,000 for each.

Digestion in Ruminant

During recent years studies have revealed previously unknown facts in regards to function of rumen organisms in digestion. Feeders have understood for years that sudden changes in rations were harmful. Explanation based on the rumen bacteria theory has been one of the major pieces of practical information developed by nutritionists. But much remains to be learned before the story can be considered in any way complete. One point in particular appears to stand out and that is the crudity of what is flatteringly referred to as the "artificial rumen." Conclusions drawn from what takes place in a glass bottle, plastic bag, or any other container so unlike the rumen itself must be discounted as unreal. At least results must be interpreted in consideration of the experimental method.

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New Pig Anemia Preventive

Armour Veterinary Laboratories, manufacturers of armidexan® claim "highly satisfactory" results of the new products developed for prevention of anemia and associated ailments in newborn and suckling pigs. Given intramuscularly, armidexan is a radical departure from the usual antianemic remedies. One 2 cc. dose is claimed to carry pigs through the early weeks of life.

The new product is a solution of low molecular dextran-iron compound originated by the Benger Laboratories, Ltd., England. Their tests indicate increased weight at weaning for treated pigs.

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"Arrows to Atoms in 50 Years"

The above designates a feature article published in the *Oklahoma Ranch and Farm World* for Nov. 11, 1956, prepared by Dr. Newton B. Tennile of the School of Veterinary Medicine, Oklahoma A. & M. College, Stillwater.

In this the author emphasizes progress in Oklahoma by brief outline of present uses of radioisotopes and new technics of nuclear medicine as applied to agriculture, particularly to the livestock industry. He said, "The potential of radioactive isotopes in agriculture is unlimited. A sizable group of these agents are certain to prove of value as diagnostic and treatment aids for veterinarians. Some are already in use by specialists."

The efficacy of piperazine as an anthelmintic has been under intensive study during recent years which has revealed its superior properties over other agents for treatment of certain species of parasites.

The value of piperazine citrate in low concentration in drinking water for periods of 24 to 48 hours against common species of helminths of sheep is reported as a result of trials conducted by the authors.

Piperazine Citrate As An Anthelmintic In Sheep

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IN a recent report, Marquardt and Fritts[1] discussed the ineffectiveness of two compounds containing piperazine (glycopiparsol and piperazine hexahydrate) in removing trichostrongyles, Nematodirus, Strongyloides or Trichuris from sheep. Gordon[2] had previously described trials with piperazine hydrate, piperazine diacetate and piperazine -1- carbodithoic betaine. He found that the three compounds were 100% efficient in removing *Oesophagostomum columbianum* and *O. venulosum* but were ineffective against *Haemonchus contortus* and Trichostrongylus spp. In a similar trial he found piperazine hydrate ineffective against *Chabertia ovina.*

The purpose of this paper is to report on the effectiveness of piperazine citrate** against the lungworm *Dictyocaulus filaria* and to review results obtained in critical and non-critical anthelmintic trials with this compound in sheep.

Effect on Lungworms

Twenty ewes, known to be infected with *D. filaria* were separated into four groups according to weight. Five were given 10 ml. of a 40% piperazine citrate solution by intratracheal injection according to a method devised by Eveleth *et al.*[3] Five were given 20 ml. and five 40 ml. of the same solution by the same method. Five were used as controls. Forty-eight hours following treatment, the ewes were killed and necropsies performed.

There appeared to be little or no effect of the drug at any level on the lungworm infections. All ewes examined harbored living lungworms.

Non-Critical Trials

Twelve lambs (six wethers, six ewes) from the same flock were randomly grouped into two lots of three wethers and three ewes each. Piperazine citrate was placed in the water of one lot at a concentration of 2.5 gm. per gal. for six days. The second lot was not treated. Both lots received identical rations. Fecal egg counts were made on the day previous to treatment and on the second, fifth, and sixth days following treatment. Worm eggs were classified into four groups, placing those of Haemonchus, Trichostrongylus, Chabertia, Bunostomum and Ostertagia into a group we shall call the trichostrongyles. Others were the nematodirid group, Strongyloides and Trichuris.

The mean fecal worm egg counts and the standard deviations of these counts are given in figure 1. A decrease in mean worm eggs per gram (e.p.g.) occurred in the treated group. Since most anthelmintics are somewhat specific as to the species of worms they remove, the compilation of egg counts into a single mean is not, for this and other biological con-

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Published with the approval of the Director, North Dakota Agricultural Experiment Station, Fargo, and the Director of the Animal Disease and Parasite Research Division, Agricultural Research Service, U. S. Department of Agriculture.

**The drug used was furnished by E. R. Squibb & Sons, New Brunswick, New Jersey.

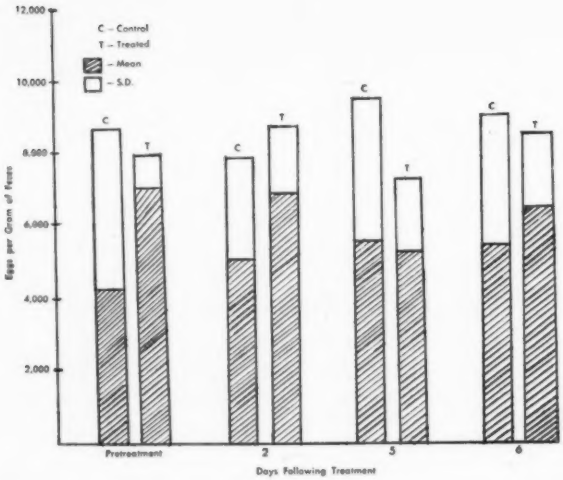

Fig. 1. Mean fecal egg counts and standard deviations of the mean.

siderations, indicative of the true picture. Table 1 indicates the mean differential worm egg counts and table 2 the mean worm counts at necropsy. From these data it was not possible to establish whether the decrease in worm eggs among the trichostrongyle group was due to elimination of certain species, *i.e. Chabertia ovina* and *Bunostomum trigonocephalum*, to elimination of a few of several species, or to a natural decrease in worm egg production.

Critical Trials

In order to ascertain the exact effect of piperazine citrate on worms of sheep, a critical trial was devised.

Three wether lambs, from the same flock were placed in different lots. Two of the lambs were given piperazine citrate in their drinking water for 24 hours; the other lamb was not treated. At the end of 24 hours water consumption was measured and, from this, drug consumption calculated. All fecal material was collected from each lamb at 17, 25, 41, 49, 65, 73, 93, 110, 118, 134, 142, and 158 hours following initial administration of the drug. The lambs were slaughtered and complete worm counts were made. Table 3 summarizes the percentage of nematodes removed. Most of the worms were eliminated within 48 hours following treatment. Both species of Oesophagostomum and all Chabertia that were removed were found in the feces within the 24 hour drug administration period. One of two Chabertia that had been present in the control lamb was passed out while 15 of 16 and nine of 12 of this species were removed from the treated lambs. Twenty-six of 30 *N. abnormalis* were removed from one treated lamb; the other treated lamb harbored none of this species. In addition to the removal of some nematodes, a large number of immature proglottids of Monezia spp. were eliminated from both treated lambs within 24 hours following dosing. No scolices were passed. Upon necropsy of the lambs, very short strobila of the two tapeworms infecting each animal remained with no mature proglottids present. The untreated animal harbored three Monezia with long strobila.

TABLE 1. Mean Differential Eggs per gram of Untreated Lambs and Lambs Treated with Piperazine Citrate

	Trichostrongyles	Nematodirus	Trichuris	Strongyloides
Untreat.				
Pretreat.	3935	200	135	135
Day 2	4330	0	135	335
Day 5	4335	267	200	600
Day 6	4530	135	135	600
Treated				
Pretreat.	5750	400	350	750
Day 2	4950	150	400	1300
Day 5	3450	200	250	1200
Day 6	4150	200	200	1550

TABLE 2. Mean Worm Counts and Standard Deviation of These Counts in Lambs Treated with Piperazine Citrate and in Untreated Lambs

Species	Untreated Mean	Untreated S.D.	Treated Mean	Treated S.D.
H. contortus	857	790	1394	939
Trichostrongylus spp.	1736	976	1215	833
Nematodirus abnormalis	849	453	1463	1979
Chabertia ovina	45	66	0	—
Trichuris ovis	20	7	80	59
Bunostomum	7	11	0	—
Ostertagia	342	416	711	354

In order to further substantiate or refute the results just described, a group of five wethers that had been wormed with a therapeutic dose of phenothiazine three months previous and then kept in cleaned concrete pens, were examined for parasites by a fecal flotation method. All were positive for Nematodirus spp. as well as Monezia spp. Other eggs of the trichostrongyle type were usually present. All infections appeared to be light.

Three of the lambs were given 0.5 gm. and one lamb 1 gm. piperazine citrate tetrahydrate per kg. of body weight by dissolving the dose in 60 ml. of water and drenching. One lamb served as a control.

All fecal material was collected for four days and thoroughly examined for worms. During this entire period *no worms were found* other than Monezia spp. proglottids.

Twelve days following the treatment the same lambs were examined for worm eggs. All were again positive. Four of the lambs were given piperazine citrate tetrahydrate in drinking water. From water consumptions dosage was calculated at 0.45 gm. per kg. of body weight over a 48 hour period. One lamb was not treated. All fecal material was collected for a period of 96 hours after first placing the drug in the water and was thoroughly examined for worms. All lambs were killed at 96 hours and the digestive tracts thoroughly examined for worms.

Results, as depicted in table 4, showed that at least 50% of the Nematodirus present were removed from each lamb. Numerically those removed were 12 of 12, 7 of 7, 6 of 9, and 2 of 4. In addition 1 of 5 and 1 of 2 Haemonchus were removed from lambs 3 and 4 respectively. No Trichostrongylus spp. were removed.

Comparison of Drench and Drinking Water Methods of Administration

In order to compare the anthelmintic efficiency of the same dose of piperazine citrate

TABLE 3. Percentage of Nematodes Removed from Lambs Given Piperazine Citrate in Drinking Water for 24 Hours

	Treated 450 mg./kg 1	Treated 380 mg./kg 2	Untreated
H. contortus	3.0	—*	0.6
T. axei	0.0	—	0.0
T. columbriformis	29.3	6.2	0.1
N. abnormalis	87.0	—	0.0
O. circumcincta	0.7	—	0.0
Oesoph. columbianum	100.0	—	—
Oesoph. venulosum	100.0	—	—
Chabertia ovina	94.0	75.0	33.3
Bunostomum	15.4	—	—
Trichuris ovis	0.0	0	0.0

*A dash indicates that no worms of this species were present in the tract at slaughter and none were found in the fecal material.

Market lamb production has proved to be a profitable livestock enterprise in some sections of the West.

TABLE 4. Percentage of Nematodes removed from Lambs given Piperazine Citrate Tetrahydrate in Drinking Water (450 mg./kg. over a 48-hour Period)

	Treated				Untreated
	1	2	3	4	
H. contortus	0	—	20	50	0
T. axei	—*	0	0	0	0
T. colubriformis	0	0	0	0	0
N. abnormalis	100	100	67	50	0
N. spathiger	100	—	—	—	0

*A dash indicates that the species was not present in the feces or digestive tract.

given in drinking water to that given as a drench 25 wether lambs, infected with mixed species of nematodes, were obtained. After determining relative worm burdens by differential fecal worm egg counts, the lambs were alotted to five groups. Seven were given piperazine citrate tetrahydrate in drinking water so that during a 24 hour consumption of water the lambs consumed an average of 250 mg. of the drug per kilogram of body weight. Five were treated the same way but at a level of 450 mg./kg. Four lambs were drenched with 250 mg./kg. and four with 450 mg./kg. of the drug dissolved in 100 ml. water. Five lambs were not treated.

Fecal matter from all of the lambs was collected for 72 hours from the time of treatment. All the lambs were then slaughtered. The fecal material was thoroughly screened and the gastrointestinal tracts were thoroughly examined (including mucosal scrapings) for worms.

The percentage of each genus removed is shown in table 5. Trichostrongylus spp. and *Trichuris ovis* were not included in the table as removal of these nematodes was less than 4% for the former and 0% for the latter. Infections of Nematodirus spp. usually were of both *N. spathiger* and *N. abnormalis*. Most worm burdens were low in number; the untreated lambs harbored a mean of 107 Nematodirus, 17 Bunostomum, 9 Chabertia, 11 Haemonchus, 394 Trichostrongylus, and 12 Trichuris.

Treatment with piperazine citrate in the drinking water at an average dose of 250 mg./kg. for 24 hours resulted in the removal of 3,502 of 3,824 Nematodirus, 124 of 127 Bunostomum, 64 of 118 Chabertia, 19 of 56 Haemonchus, 331 of 8,541 Trichostrongylus and 0 of 33 Trichuris. Similar treatment at 450 mg./kg. removed 679 of 781 Nematodirus, 48 of 63 Bunostomum, 42 of 44 Chabertia, 64 of 4,126 Trichostrongylus, and 0 of 7 Trichuris. Drenching with 250 mg./kg. removed 26 of 299 Nematodirus, 8 of 10 Bunostomum, 0 of 31 Chabertia, 0 of 24 Haemonchus, 17 of 846 Trichostrongylus and 0 of 24 Trichuris. Drenching with 450 mg./kg. removed 28 of 473 Nematodirus, 10 of 31 Bunostomum, 0 of 29 Chabertia, 0 of 8 Haemonchus, and 24 of 632 Trichostrongylus.

As previously noted, large numbers of mature proglottids of Monezia sp. were found in the treated lambs feces. However short strobila remained in the intestines.

Discussion

The results reported here agree with those published by Gordon[2] in respect to Oesophagostomum and Trichuris, but differ from his results with respect to Chabertia. They also differ in respect to removal of Nematodirus spp. from those expressed by Marquardt and Fritts.[1] Gordon injected piperazine compounds into the rumen or abomasum while Marquardt and Fritts administered the drugs in gelatin capsules. While these methods are not directly comparable to drenching, each of the three

TABLE 5. Percentage of Nematodes Removed From Lambs Treated With Piperazine Citrate

	24 Hr. Treatment — In Drinking Water												
	250 mg./kg.							450 mg./kg.					
	1	2	3	4	5	6	7	1	2	3	4	5	
Nematodirus	100	81	92	0	88	—*	100	100	87	0	100	96	
Bunostomum	—	91	100	100	100	100	100	100	0	0	95	100	
Chabertia	73	39	100	0	88	0	0	—	—	0	100	100	
Haemonchus	—	—	—	0	76	—	0	—	0	0	26	50	

	Drenched								Untreated			
	250 mg./kg.				450 mg./kg.							
	1	2	3	4	1	2	3	4	1	2	3	4
Nematodirus	10	0	56	0	0	0	28	0	0	0	0	0
Bunostomum	—	—	100	0	28	—	25	100	0	0	0	0
Chabertia	0	0	0	0	0	0	0	0	0	0	0	0
Haemonchus	—	0	—	0	—	0	0	—	0	—	0	0

*A dash indicates that the genus was not present in the feces or digestive tract.

places a relatively large concentration of the drug used in one portion of the digestive tract. Consequently elimination of the drug through the digestive tract takes place with much less dilution than would have taken place if the same dose had been dissolved in the drinking water. The results obtained when piperazine citrate was placed in the drinking water indicate that low concentrations of the drug over a 24 to 48 hour period are more effective than administration of the same concentrations by drenching.

Summary

Intratracheally injected doses of 10, 20 and 40 ml. of a 40% solution of piperazine citrate were not effective in removing *Dictyocaulus filaria* from ewes.

Non-critical trials suggested that some nematodes were removed when lambs were given 2.5 gm. of piperazine citrate per gal. of drinking water for six days.

Critical trials using from 250 to 450 mg. of piperazine citrate per kg. of body weight in drinking water over a 24 or 48 period showed that this method was highly effective in removing Nematodirus sp., Bunostomum, Oesophagostomum sp. and Chabertia from lambs. It was ineffective in removing Trichostrongylus sp., Trichuris and Haemonchus. Drenching with the same doses that were given in the drinking water did not remove Nematodirus sp. or Chabertia and did not as effectively remove Bunostomum.

Additional critical trials using four treated lambs and one control showed that the drug, administered at 450 mg./kg. over a period of 48 hours in the drinking water, was 100% effective in two lambs and 67 and 50% effective in two other lambs in removing Nematodirus. In two of three lambs infected with *H. contortus*, 20 and 50% of this species were removed while none were removed from the third lamb. *Trichostrongylus axei* and *T. colubriformis* were not removed.

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Studies On An Anti-inflammatory Antibiotic Udder Infusion Preparation For The Treatment Of Bovine Mastitis

E. J. FOLEY,* Lafayette, New Jersey

MUCH has been published on the treatment of infectious bovine mastitis,[1,2] and numerous products containing antibiotics and other antibacterial agents have been devised. Streptococci of Lancefield's group B (*Streptococcus agalactiae* and *Streptococcus mastitidis*) are responsible for the majority of cases of mastitis in this country, while streptococci of group C (*Streptococcus dysgalactiae, Streptococcus zooepidemicus*) and *Streptococcus uberis* are less frequently found. Staphylococci are also important udder pathogens, and occasionally coliform organisms are found.

All infections cause inflammation which may be of an acute or chronic nature.[3] Inflammatory episodes lead to damage to secretory tissue and ultimately extensive involution results. With the demonstration of the marked anti-inflammatory effect exerted by prednisone (meticorten*),[4,5] it was of interest to study the effect of intramammary instillation of this steroid together with selected antibiotics in the treatment of streptococcus infections of the lactating bovine udder. It has been shown previously that hydrocortisone has anti-inflammatory properties in infected udders.[6]

Materials and Methods

Leukocyte counts were made by the Prescott-Breed method, pH determinations by the addition of brom-creosol purple.[1] "Fore milk" samples of approximately 20 cc. were taken at 12-hour intervals morning and night. The samples were chilled immediately after being obtained, and were stored at a temperature of 4 C. until used.

The milk was cultured by mixing 0.1 ml. with 20 ml. of tryptose agar containing 0.5% defibrinated rabbit blood and cooled to 45 C. The blood agar was poured into petri dishes which were incubated for 24 hours at 37 C., after which colony counts were made. The streptococci were identified by means of specific grouping serum by the Lancefield technic, and by determining the cultural characteristics in methylene blue milk, in sodium hippurate and in aesculin broth.[1]

The antibiotic content of the milk samples was determined by the paper disc method using *Staphylococcus aureus* 209 ATCC 6538 as the test organism. Penicillinase was used to destroy penicillin when streptomycin assays were required.

The cows used in most of the work produced approximately 1 to 1.5 liters from each quarter at each milking.

Other details are given in connection with the various experiments.

Experimental

Action of Meticorten in Normal Quarters in which Inflammation was Provoked by Instillation of Saline. The introduction of many substances into normal udders will induce a well defined leukocytosis and a rise in the pH of the secretion. These inflammatory effects can be determined by suitable study of samples obtained at the regular milkings after instillation of irritants. The inflammation which occurs following instillation of physiological saline is transitory, and the milk returns to normal within a few days. Experiments undertaken to determine whether meticorten would alter the degree of inflammation induced by instilling 25 ml. of physiological saline are shown in graph I.

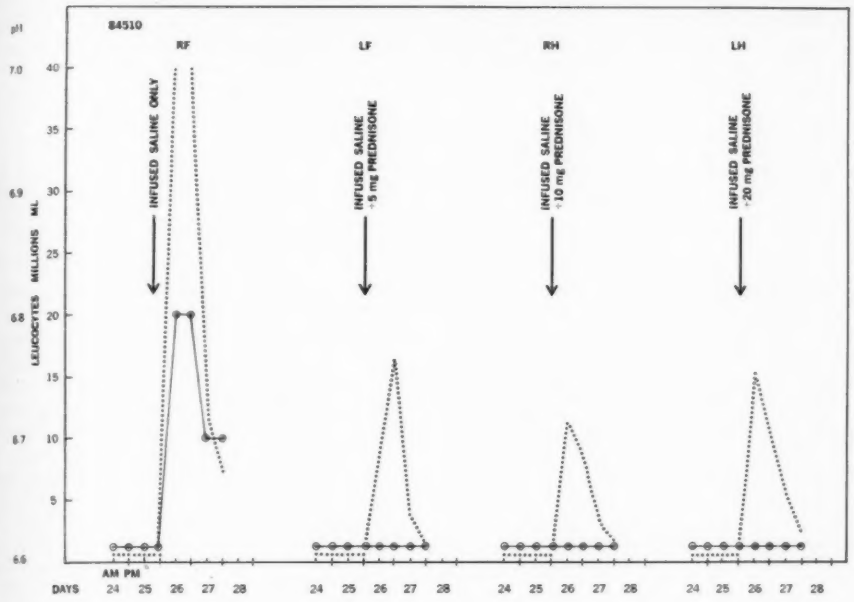
The data in graph I show that well defined anti-inflammatory effects are obtained when meticorten suspended in 25 ml. volumes of physiological saline is instilled into normal quarters. The magnitude and the duration of the leukocytosis induced in the treated quarters

*Umbrian Farms Research Laboratories.

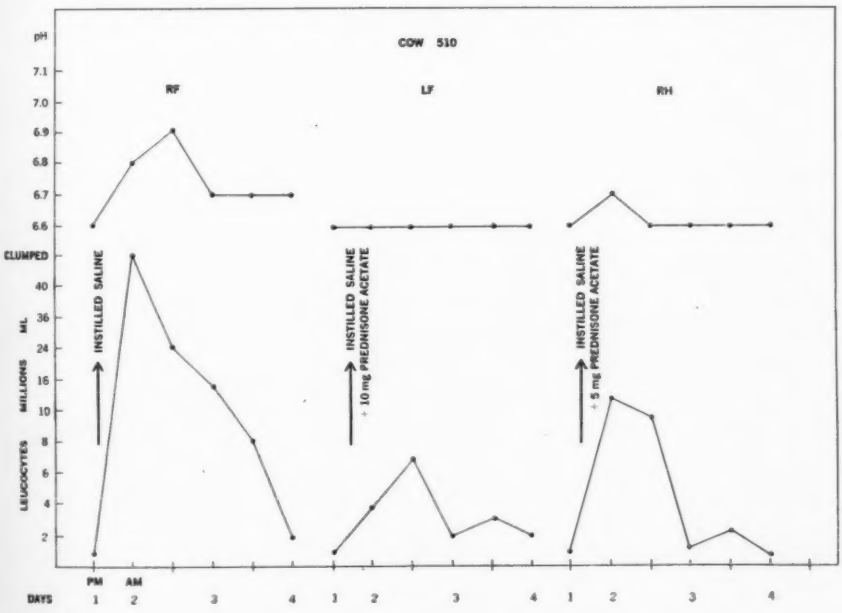
*Meticorten is the trade name of Schering Corp., Bloomfield, N. J., for prednisone.

**Metibiotic is the trade name of Schering Corp., Bloomfield, N. J., for the prednisone acetate-penicillin-streptomycin combination for the treatment of mastitis.

GRAPH I. Effects of Prednisone on Inflammation Caused by Instillation of Saline in Normal Quarters



GRAPH II. Effect of Prednisone Acetate on Inflammation Caused by Instillation of Saline



is demonstrably less than in the control quarter which received saline only. It will be noted in this instance that a rise in pH failed to occur in the quarters which received steroid. Similar effects were observed when meticorten acetate was instilled (graph II).

Graph III shows results in normal quarters which were instilled with 25 ml. of saline and then treated (within five minutes) with a self-emulsifying dispersible vehicle containing 4 mg. of meticorten acetate (product A).

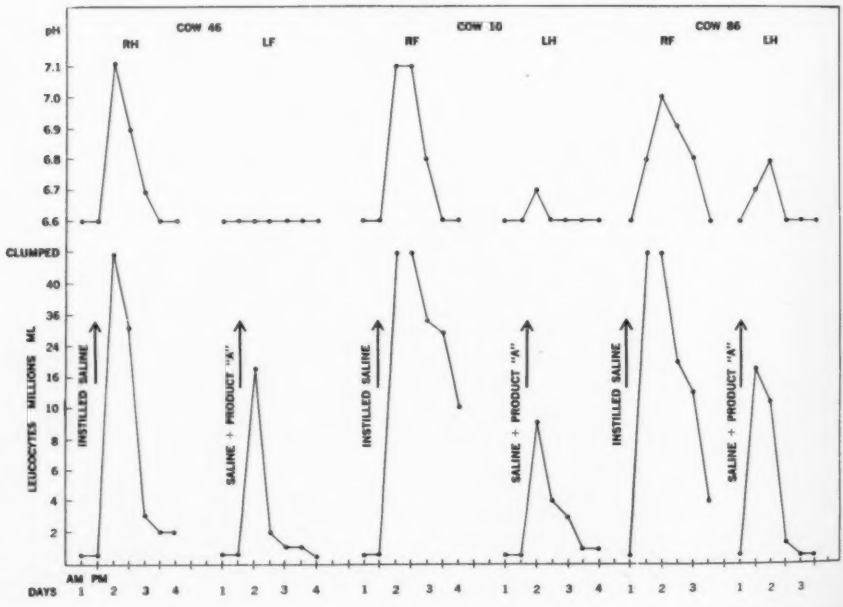
Other experiments demonstrate that the anti-inflammatory effects were not due to the vehicle. Quarters infected with *Strep. agalactiae* were instilled with the vehicle, and with the vehicle containing 4 mg. of meticorten. Streptococcus population and leukocyte counts were made on samples withdrawn at the regular milkings following instillation. The experiment was repeated after six days at which time the quarter which had previously received the vehicle was instilled with the vehicle containing meticorten. It was observed that the meticorten product reduced leukocytosis whereas the vehicle did not. This experiment was repeated in other infected quarters with similar results.

Experiments on the Antibiotic Retaining Property of the Vehicle. The importance of using retaining vehicles for the instillation of penicillin into streptococcus infected udders has been demonstrated previously. By means of properly prepared vehicles, effective levels of the antibiotic can be maintained in the udder for extended periods after a single instillation.[7,8] It has been shown that a high percentage of cures is obtained following a single treatment when such vehicles are employed.[9,10] A vehicle was devised which would disperse the antibiotics throughout the gland after instillation. For convenience in dosing, the product was packaged in collapsible tubes.

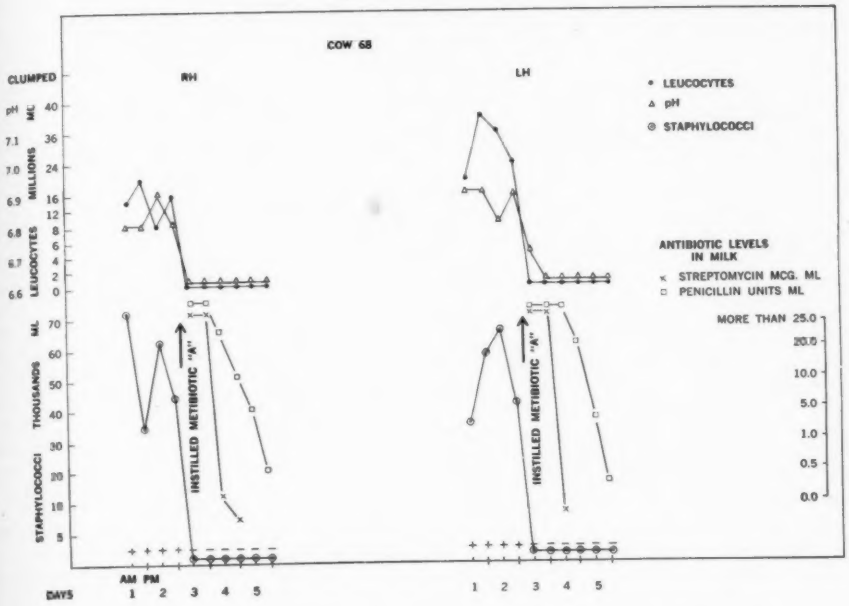
Treatment of Infected Udders. Metibiotic,** a product containing 4 mg. of meticorten, or meticorten acetate; 300,000 units of procaine penicillin G; and 300 mg. of dihydrostreptomycin base in a self-emulsifying dispersible vehicle, evolved on the basis of the previous studies, was given intensive trial for the treatment of streptococcus and staphylococcus udder infections. (The product containing meticorten acetate is referred to as product A, and that containing meticorten as product B.)

The course of recovery in two quarters with chronic mastitis caused by *Staph. aureus* treated with product A is indicated in graph IV. Graph V illustrates recovery of two quarters with chronic streptococcus infection, and graph VI the recovery of acute mastitis after instilla-

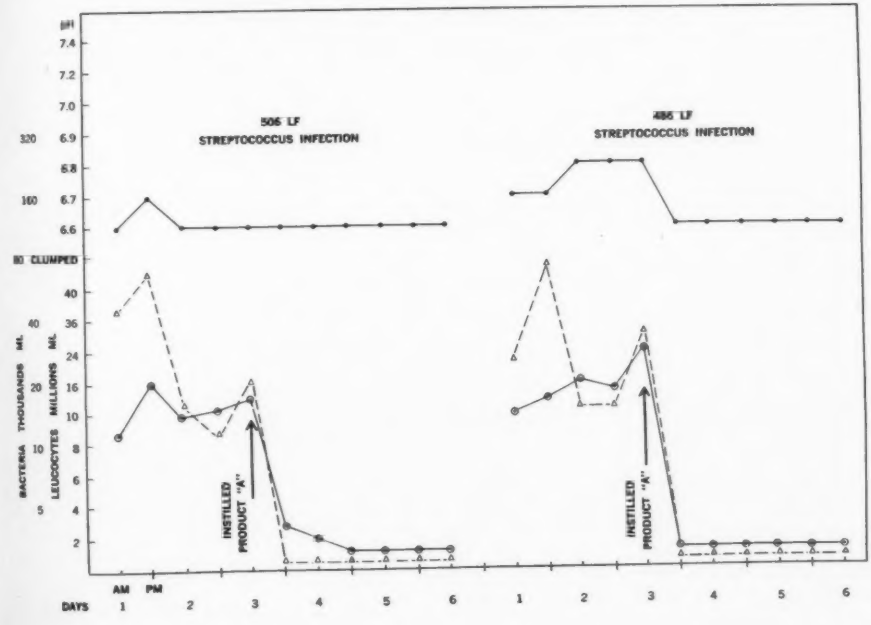
GRAPH III. Effect of Metibiotic (Acetate) on Inflammation Caused by Instillation of Saline



GRAPH IV. Effect of Metibiotic (Acetate) on Staphyloccus Infections



GRAPH V. Response of Infected Quarters Following Treatment with Product "A"



tion of product B as compared with a quarter treated with penicillin in penicle®. The quarters treated with product B promptly responded with a sharp drop in leukocytes and pH values. The streptococci disappeared and were not recovered on subsequent cultures taken twice daily over a two-week period. The response obtained in these cases was typical of many observed during the course of these studies. Prompt return to normal secretions is the rule. This is in contrast to the slow abatement of inflammation seen in the quarter treated with penicillin in the retaining vehicle penicle (graph VI).

Discussion

The experiments described were undertaken in an attempt to determine whether local instillations of meticorten or meticorten acetate would retard inflammation in lactating udders. The data indicates that this does occur. And it would appear that quantities as small as 4-5 mg. are adequate for the effect. In quarters infected with *Strep. agalactiae* which are successfully treated with penicillin, the secretions eventually return to normal. However, this may require from three to five days in acute cases. It was observed in experiments reported elsewhere[11] that certain products augment existing inflammation in infected quarters.

It has been our aim to accelerate the return of secretions to normal by checking the progress of inflammation by means of cortical steroids. Use of such products has practical advantage in minimizing udder tissue destruction. In experiments not shown in the graphs, the effect of using two tubes of product at one instillation, or repeated instillations at various intervals was studied. Two tubes instilled at one time appeared to give no greater anti-inflammatory effect than a single tube. However, several cows with greatly swollen udders were treated with a single tube, and retreated after 48 hours with a single tube. By such means, greatly prolonged penicillin levels can be obtained, and in the few quarters in which complete cessation of inflammation did not occur following the first treatment, a second completely reduced inflammation.

Summary

The experiments described show that both meticorten and meticorten acetate have marked anti-inflammatory effects when instilled in infected udders, or in those irritated by infusion of saline. Products containing these steroids

(Continued on page 251)

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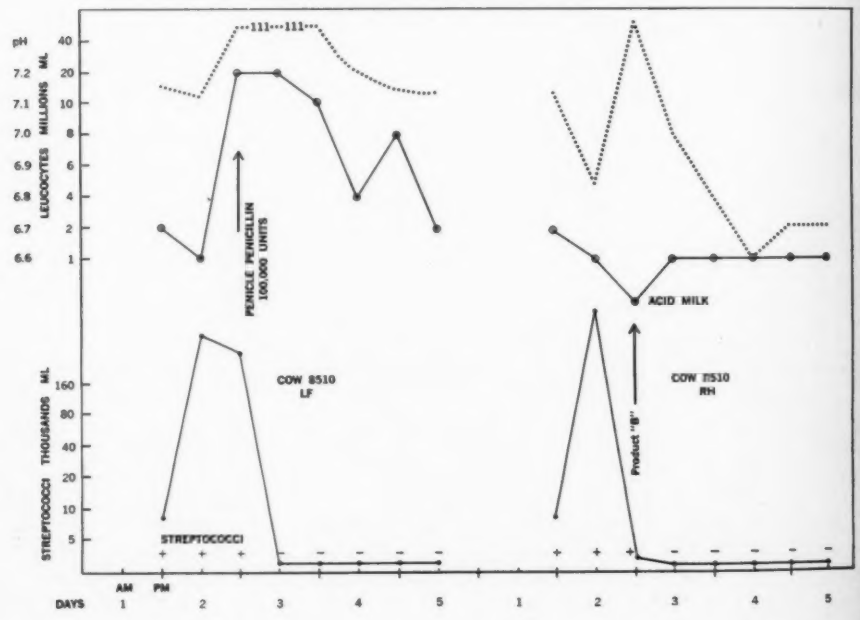
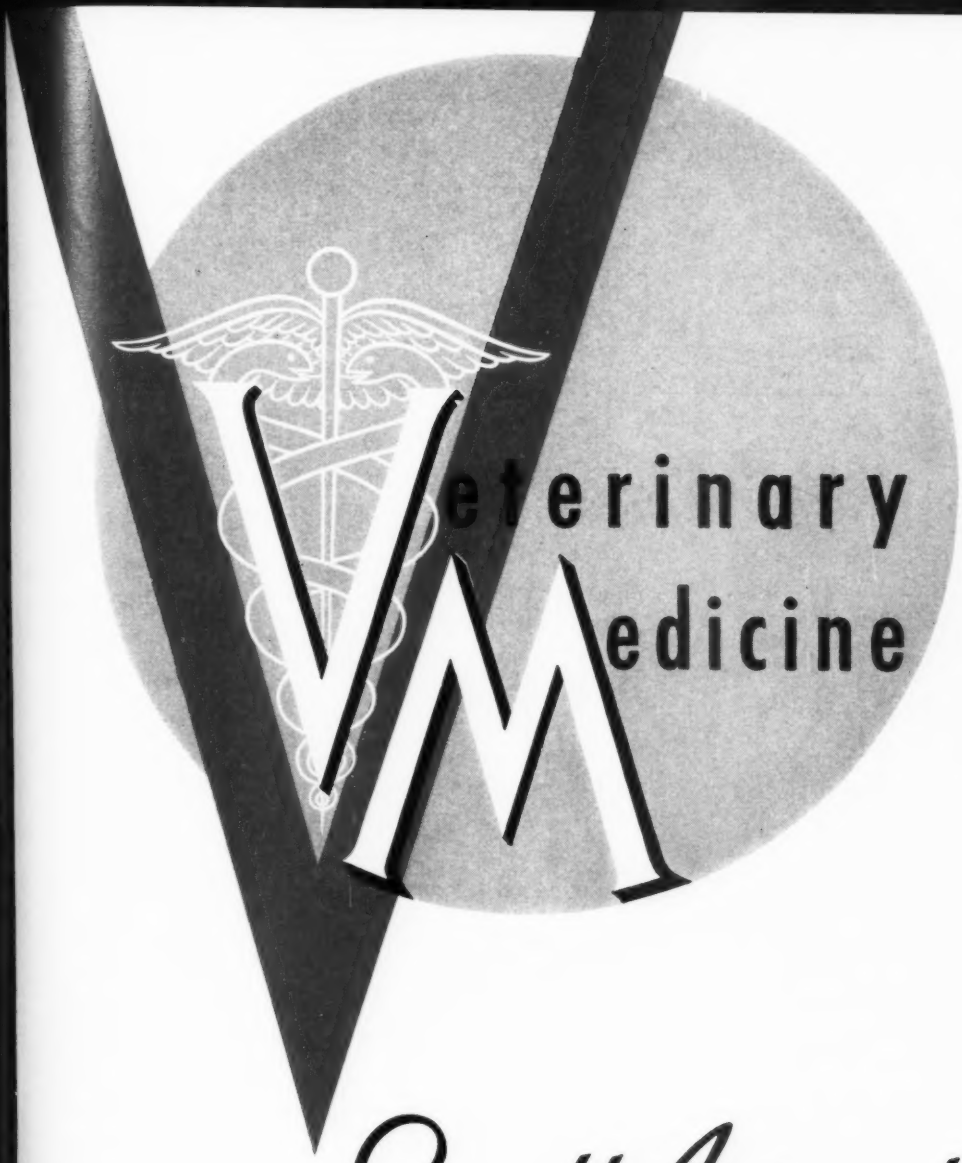
GRAPH VI. Treatment of Infected Quarters with Product "B" and Penicle





Small Animal

SECTION

THERAPEUTICS • MEDICINE • SURGERY

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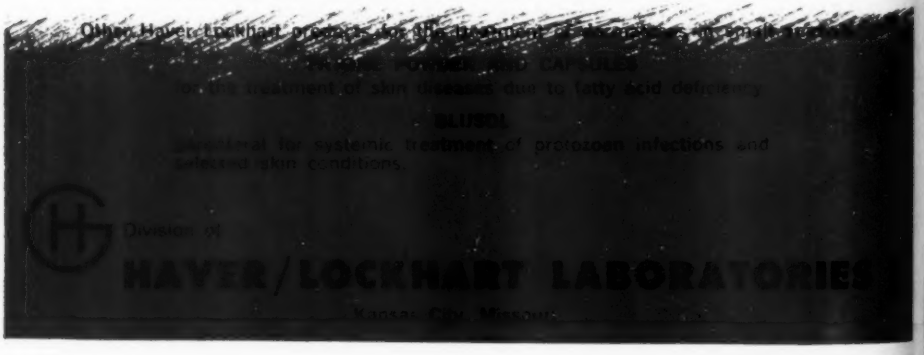
Trikicide Powder is a highly effective bactericide and fungicide for the treatment of dermatoses in both cats and dogs. A "dry" medication, it is recommended for preventing and treating ringworm, moist eczema and other weeping skin lesions, and ear canker.

The primary ingredients of Trikicide powder are 2, 2'-methylene-bis (4 chlorophenol) and oxyquinoline benzoate. Nontoxic to the host, this specially processed powder clings to the skin, promoting contact of the active ingredients with the causative agents.

Supplied: **Trikicide Powder**—Pkg. 12 x 1¼ oz. plastic spray bottles; 1 lb. hospital size.
Trikicide Solution—12 x 4 oz. plastic squeeze bottles; gallon bottles.



Radiological Hazards Due To Exposure To Low-Energy Radiation In Veterinarians: An Enviromental Study†

A. ABRAHAMS, B.S., S. J. HARRIS, B.S., I. PAUL, B.S., and G. W. PAUL, New York, New York*

Detrimental effects of radiation have only lately received the attention they deserve. Reduction of hazard in the use of equipment ordinarily employed by veterinarians can be accomplished by observing well-known principles established for radiology in general.

Minimum exposure consistent with desired results should be held as a major consideration. The established level of 0.3 r. per week should be regarded as a maximum dose or extreme, and not as a level to maintain continuously.

CHRONIC exposure to ionizing radiation from low-voltage sources is known to produce damage to living tissue.[1] Studies of the occupational exposures and the resulting damage among physicians, dentists, medical fluoroscopists, and shoe-fitting machine operators have confirmed the reality of the hazard from the use of *x*-rays in film radiography and screen fluoroscopy.

Since veterinarians have used *x*-ray film radiography and screen fluoroscopy in their practice for about 50 years, a study of their exposures and the damage incurred was undertaken. The results of the damage which had occurred, determined by a medical survey, will be reported separately. The purpose of this paper is to (1) report the estimated exposure to ionizing radiation among veterinarians as determined in an environmental survey, (2) evaluate these exposures in terms of the present concepts of hazardous exposure, and (3) discuss control measures to keep the exposure at nonhazardous levels.

Methods

There are 193 registered veterinary establishments employing about 300 persons in the New York metropolitan area. Sixty of these establishments were selected at random for study. Among them 50 currently use *x*-ray units and employ 74 veterinarians, six assistants, and one kennelman. Veterinary work in the area surveyed is almost entirely with household pets.

The radiation output was measured for the primary beam intensity at the target position under normal operating conditions by means of a condenser r-meter. The radiation due to scatter was measured at the normal working positions of the veterinarian and his assistant and at other points in the working area with an ionization chamber survey meter. Radiation measurements were made using paper or other "phantom" devices to produce a scatter radiation pattern similar to that obtainable with an animal subject in place. The operator's statement of normal operating conditions was accepted. These measurements were considered to represent the maximum dose to which these individuals could be exposed.

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*Radiophysicist (Mr. Abrahams); Industrial Engineer (Mr. G. W. Paul), and formerly associate radiophysicist (Mr. Harris), Division of Industrial Hygiene, New York State Department of Labor; Sanitary Engineer (Mr. I. Paul), Environmental Sanitation Unit, New York City Health Department.

Fig. 1.* Proper preparation for radiography. Note student veterinarians wearing leaded gloves and aprons and radiation monitoring devices on collar.

The duration of exposure was estimated on the basis of the frequency and duration of the usual radiological examinations. The estimate was a composite of direct observation and the veterinarian's statement, *e.g.*, radiographs were counted and multiplied by exposure times in radiography, but for fluoroscopy the operator's estimate had to be accepted. While these estimates varied from ten seconds to five minutes per exposure and from one to ten exposures per week, the accuracy of the estimations was checked by observation of work being done at the time of the survey.

The measured intensity of radiation was multiplied by the total estimated duration of exposure to obtain a measure of total exposure for various work periods.

The type and condition of the *x*-ray unit and protective equipment available were examined and recorded. The effects of varying voltages and currents on radiation flux under actual conditions of use were noted. In general, the flux was found to follow the well-known relation of linear increase with the tube current and with the square of the voltage. Scatter intensity increased markedly with target size.

Operating technics in using the machine and the protective equipment and in handling animals were observed and recorded.

Results

Thirty veterinarians performed radiography only; 14 did only fluoroscopy; 29 did both, and eight did no *x*-ray work whatever.

The primary beam output is given in table 1 as weekly exposure. These values are cited to represent the maximum possible exposure of an assistant holding animals for radiography or a veterinarian handling animals for fluoroscopy. The figures represent radiation output rather than actual exposure to any person and thus are a measure of the order of magnitude of the hazard.

The intensity of scatter radiation is presented in table 2 as exposure per week. These values represent a portion of the actual exposure incurred in this work. A comparison of primary beam intensities with the scatter radiation is given in table 3.

The radiological equipment predominantly in favor for veterinary purposes has been especially designed for such work. The Campbell Animagraph and General Electric veterinary *x*-ray units were in use in over half the establishments visited. The models in use were of variable age; later models contained built-in protective devices, such as cones, filters, and shields. Although earlier models did not have

TABLE 1. Estimated Weekly Primary Beam Output at Working Area

Output in Roentgens	Total	Radiography Only	Fluoroscopy Wholly or Partially
Unknown	12	—	—
0.0—0.99	20	17	3
1.0—9.9	20	9	11
10.0—99.9	21	3	18
100.0—999.9	7	—	7
1000.0	1	—	1
Total	81	29	40

Note: Maximum permissible level of *x*-radiation exposure is .3 r per week.

*Photo courtesy Radiology Department, School of Veterinary Medicine, Oklahoma A. & M. College, Stillwater, and A. & M. College Photographers.

such devices built in, these had been added later in a few cases. At the time of the survey about half the machines examined had such filters.

Protective equipment, such as leaded rubber gloves and aprons, were available for 66 of the persons occupationally exposed to radiation but were frequently in poor condition and seldom used consistently. No lead control panels or other metal shielding designed to protect workers, such as the operator of the machine or the holder of the animal, were used anywhere.

During radiography the animal is strapped down or held by an assistant or the owner. The assistant is thereby exposed to the higher-intensity scatter near the beam and at times inadventently to the beam itself. The veterinarian operates the machine and so is farther away, but because of generally limited working space used, he is still fairly close. Veterinarians doing only radiography usually used machines operating at fixed voltage and current and producing *x*-rays of stable quality and intensity, only the time being variable. Such users were predominantly recent graduates or older practitioners who had sustained damage.

Fig. 2.* Junior Veterinary student, Jack Peterson, setting minometer reading scale to check radiation exposure received by clinic personnel at the Oklahoma school.

In fluoroscopy the veterinarian watches the screen intercepting the primary beam after its passage through the animal, usually controlling the machine with a foot switch while simultaneously holding or manipulating the animal. Thus, his torso is exposed to high-intensity scatter and his hands, forearms, and eyes to the primary beam for appreciable periods. Leaded glass is generally used for such screens but might not be of sufficient thickness or lead content to afford adequate protection against a prolonged exposure to highly energetic radiation.

TABLE 2. Total Estimated Weekly Exposure in Milliroentgens from Scatter Radiation Normal Working Position

Milliroentgen	Cases
No information	13
0.0-0.9	15
1.0-9.9	20
10-29.9	15
30-99.9	5
100-199	5
200-299	3
300-399	2
400-599	2
600-	1

Most of those doing fluoroscopy used machines having variable voltage, current, and time controls. Time-control switches were used in radiography but not in fluoroscopy where they are most needed. Most film exposures are limited to one to five seconds by the quality of the film required. Fluoroscopic exposures are limited only by overheating of the equipment and often exceed one minute.

None of the establishments had been previously surveyed for radiation hazards. No veterinarian budgeted the radiological work load to limit his exposure. Although many expressed knowledge of the possible hazard verbally, the working habits of most did not reveal any practical appreciation of the risk.

Comment

The results should be interpreted in the light of the limitations apparent in the methods. The physical measurements of radiation intensity present in the environment at the time of the survey, called exposures, do not represent the amount of radiation actually absorbed by subjects, the dose. There is no means of measuring the latter directly; our estimates do not take account of such possible variables as changes in equipment and technics, work volumes, and type of *x*-ray work.

The figures are an approximation of the potential exposures and, when compared with present safety standards, reveal a need for better control. The present acceptable upper limit for prolonged exposure is 0.3 r. per week for the torso and 1.5 r. per week for the hands.

It can be seen from table 1 that the primary beam exposures exceed this level in most cases

by as much as 3,000 times. The potential danger if a person is exposed to these levels even a small part of the time indicates the need to keep the intensity to the minimum necessary and to avoid such exposures at any time. Particularly does this caution apply to assistants holding animals for radiography and to fluoroscopists, because here inadvertent exposure can occur most easily.

Moreover, not all the radiation is confined to the primary beam, since a complicated set of secondary radiations, called scatter, is generated as the primary beam strikes matter. The need for caution in avoiding unnecessary exposure to the primary beam is underscored by consideration of this ubiquitous scatter radiation. Examination of table 2 shows that exposures were in excess of weekly permissible levels in a few cases, and sufficiently near these levels in an appreciable number to add significantly to any primary beam exposure. Even where scatter intensity is not in itself excessive, it must be guarded against, because it is more diffuse than the primary beam, and its effects are, of course, additive. Work nearer the animal involves higher exposure due to greater radiation intensities from both scatter and primary beam.

Inspection of table 3 further evinces the greater order of magnitude of the danger from the primary beam, as shown by the time limits in the last line. The ranges and medians show the nonlinear relationship of primary beam to scatter. Other factors affecting the quantity and location of scatter are the nature and thickness of the tissue irradiated, the direction of the beam, and the presence and position of other objects in the room. The practical point is that minimal beam intensity does not guarantee minimum scatter.

TABLE 3. Primary and Scatter Dose Rates Found in Veterinary Medicine

	Primary Beam	Scatter
Range in roentgens per hr.	300-109, 800	0-5.0
Median dose rate, r/hr.	1680	0.9
Region of exposure	Hands and forearms	Torso
Weekly permissible dose limit to region of exposure in r/hr.	1.5	0.3
Total permissible weekly exposure time for median dose rate	3.2 sec.	20 min.

It is well known that not all the *x*-rays generated in the tube are useful. Metals of low atomic number, like aluminum, can be used as a filter to eliminate the useless but still damaging low-energy rays. Metals of high atomic number, like lead, can be used as shields to confine the useful higher-energy rays to useful areas. The absence of such protective devices in half the machines surveyed indicates the inadequacy of the equipment used in veterinary radiology. Moreover, even where available, these devices were but irregularly used.

Both the penetrating power, determined by the voltage, and the energy intensity, determined by the current, increase the damaging effect of the radiation. The time of exposure is the third important factor. Yet the choice of current, voltage, and exposure time is made without regard for the hazard. In many cases currents and voltages used are in excess of

Fig. 3.* Student training in radiography emphasizes precautions to avoid overexposure to Roentgen rays. Note leaded aprons, gloves, and shields worn by operators and cone limiting field of direct rays. Senior student Bert Briscoe at halter.

Fig. 4. Roentgen ulceration. Radiologists repeatedly exposed to Roentgen rays are warned that lesions develop slowly, rarely heal. Illustrated are the hands of an Argentine radiologist (Roffo).

those actually needed. This not only increases the hazard but also the expense of operation and the wear on the equipment as well.

Similarly, although fluoroscopy is inherently more dangerous than radiography, because the operator must be closer to the primary beam and the greatest intensity of scatter, the choice between these methods is more frequently made on the basis of convenience than effectiveness.

The generally careless attitude toward radiation is shown by the failure to use the rudimentary personal protection, such as wearing gloves and apron during *x*-ray operating procedures, even when these are available. Like other professional groups, such as physicians and dentists, most veterinarians are aware that there is a hazard and know enough to understand the necessary control measures. However, in many cases they have failed to appreciate the continuing seriousness of the danger and have become careless. Some should be reminded of basic principles to realize that in many respects unsafe operation is also inefficient operation.

As stated, the recorded measurements of radiation intensity in air do not represent the actual tissue dose absorbed by the individual, but the reality of the danger can not be denied in view of the actual radiation damage found among these veterinarians.

Control

The reduction of the hazard can be accomplished by observing the well-known principles established for radiology in general. The goal of control must be the minimum exposure consistent with the desired radiological results. The established level of 0.3 r. per week should be regarded as a maximum or extreme, not as a level desirable to have maintained continuously.

1. The *x*-ray unit should be of modern design for veterinary purposes and maintained in good repair and calibration to assist in achieving the required penetration with a minimum of energy output.

2. The useful emergent beam should occupy the smallest possible area. Cones for this purpose should be either built into the equipment or added to it.

3. Since the lower-energy *x*-rays are not useful and may be damaging, they should be eliminated from the primary beam by metal disc filters.

Fig. 5. Illustrating chronic Roentgen dermatitis, sometimes called Roentgen hands. Note splitting nail and advanced keratoses (Duffy).

4. To minimize scatter, the primary beam should be confined to that portion of the animal needed for the diagnosis by proper shielding of the working area.

5. Current, voltage, and time should be selected to produce a good picture with a minimum hazard.

6. Radiography should supplant fluoroscopy wherever possible.

7. Shielding should be installed as needed to protect the operator.

8. The animal should be anesthetized or strapped in place in preference to being held in place manually.

9. Where fluoroscopy is essential, leaded rubber gloves and apron in good condition should be used; the screen should be made of leaded glass and maintained in good condition, and the operator should dark-adapt his eyes before operating the fluoroscope to reduce the needed time of exposure.

10. Records of the number and type of procedure should be kept so that at least some approximation to the duration of exposure is known. If it appears excessive, the work should be replanned so as to reduce it.

11. Unprotected exposure to the primary beam must be avoided. It is the greatest possible hazard in the operation, and it is unnecessary to subject oneself to it.

12. Personnel dosimetry should be practiced where weekly exposures in excess of 75 mr. exist.

13. Blood counts and medical examination of the hands (for fluoroscopists) should be performed at least annually.

Conclusion

A survey of radiation hazards among veterinarians included about one-third of such establishments in the greater New York metropolitan area. Measurements of the duration of exposure revealed the existence of potentially hazardous conditions in a considerable proportion of establishments. Actual damage had occurred in some veterinarians and is reported separately. Fluoroscopy presents greater hazard than radiography and is in more extensive use.

Lack of "safety consciousness" in choice and use of equipment and in neglect of protective measures adds to the hazard.

A number of factors necessary to adequate control, applying the cardinal radiation protection principles of time, distance, and shielding, are discussed. These measures can be effective only when intelligently applied by knowledgeable persons.

Mr. Charles Shackford rendered technical assistance in making the required measurements.

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Disbandment of K-9 Corps Proposed

Plans by the U. S. Army to drop its K-9 Corps, which involves the demobilization of 950 army dogs currently on duty at home and abroad and the discontinuance of training about 50 animals a month the Army has been furnishing the U. S. Air Force, have been announced.

In view of the difficulties attendant dog recruitment during World War II, Mr. Harry Miller, Gaines Dog Research Center, termed the move "exceedingly short-sighted." He pointed out that the K-9 Corps today is a "reservoir of experience gained from the services of thousands of dogs during World War II and Korean conflict." Services these animals performed during recent wars in the U. S. Army and allied armies have been notable examples of dependability and adaptibility to many situations.

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"The Pet Craze"

Americans are spending an estimated $3,000,000,000. a year to purchase and pamper their pets, according to *Newsweek* for Mar. 11, 1957. Approximately 100 pet food manufacturers who serve 22,500,000 dogs and 28,000,000 cats did a $275,000,000. gross business in 1956.

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A bill requiring compulsory rabies vaccination of all dogs in New Mexico was introduced in the House by Representative W. O. Culbertson of San Miguel County.

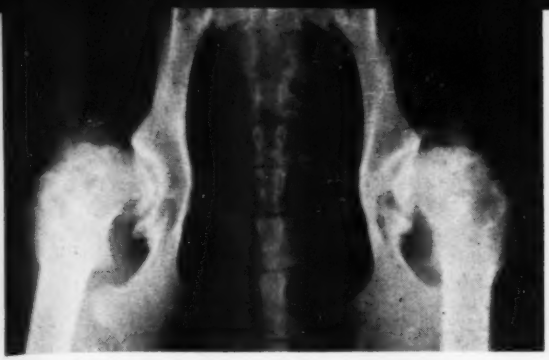

Fig. 1. X-ray of four-year-old Samoyed dog illustrating coxafemoral dysplasia. This is considered a good example of malum coxae senilis.

Elimination of Coxafemoral Dysplasia From A Breeding Kennel†

PHILIP L. McCLAVE, D.V.M., Reseda, California

THIS is the report of over four years of work in the attempt to eliminate coxafemoral dysplasia from a kennel of Samoyed without losing blood lines on which the kennel was founded.

Satisfactory accomplishment of this end must be credited in a large measure to the owner of the kennel for cooperation in carrying the program through completion. Selection of individuals and elimination of some otherwise outstanding specimens from breeding stock assured success of the project. My part has been to make roentgenograms and report as accurately as possible on the condition of the coxafemoral structures. The owner's study of genetics and exercise of the trial and error method have virtually eliminated coxafemoral dysplasia from puppies produced by this kennel during the past two years.

No attempt will be made to define hereditary aspects. The work reported here may help in the eventual elimination of this undesirable anomaly common to a number of breeds of dogs where it has become such a serious problem and of major concern to veterinarians and breeders.

Coxafemoral dysplasia was purposely selected as a title to cover any deviation from normal in the development of the hip joint. Dysplasia means abnormal growth, whether intrinsic or extrinsic. This discussion will be limited to bony changes which are apparent on *x*-ray examination. Abnormalities of cartilage, ligament, joint capsule, and muscles which are involved will not be discussed in this paper.

Deformities found in these studies appear to be only a matter of severity as far as their inherited tendencies are concerned. What may appear as a slight dysplasia in the three-to four-month-old puppy may progress to the stage of pseudoluxation by the time the animal is nine to 12 months of age.

The condition was first discovered when a male (fig. 1) was presented at approximately

Fig. 2. Eight-week-old puppy. Note Shenton's line deviation, flattened and irregular femoral heads, exostosis of femoral necks.

†Presented at the 23rd annual meeting of the American Animal Hospital Association, Miami Beach, Fla., May 23-26, 1956.

four years of age showing extreme soreness. Hip *x*-rays revealed severe malum coxae senilis.

This dog was one of a litter of five consisting of two dogs and three bitches. All but one had won championship points in major competition and until this time none of the litter has shown any lameness. Two were being used in a dog sled team making appearances on the West Coast. Four of the animals were foundation stock. Roentgenoscopy was made on each individual and all but one exhibited severe arthritic changes.

Representative photos of conditions found have been chosen from nearly one hundred radiograms made in this study. I have classified the hips as normal, slight dysplasia, moderate dysplasia, pseudoluxation, and complete luxation. Some puppies *x*-rayed at the young age of two-to three-months and considered as suffering slight dysplasia are likely to exhibit more pronounced changes by the time they have reached maturity. The *x*-rays included are those considered to be typical of the conditions to be discussed.

Fig. 3. Pseudoluxation (left) in a two-year-old dog.

Fig. 4. This five-year-old dog was clinically sound when examined. Note flattened femoral heads and obliteration of femoral necks.

Fig. 5. Illustrating typical exostosis of right femoral neck. Note also moderate dysplasia—near pseudoluxation.

Positioning for X-ray Examination

Proper positioning for satisfactory radiograms is most important. A dorsal-ventral view with the patient flat on its back and with legs extended directly posteriorly and flat down to the table is preferable. If this is painful, dysplasia is nearly always present.

Diagnosis is dependent upon a number of factors principal of which are:

1. Shenton's line or arch. A line drawn from the obturator foramen should follow around the neck to the femur to form an ellipse. If it falls below the neck, dysplasia is present.

2. Coxaplana. Shallow acetabulum.

3. Deviations in shape of the femoral head. A normal head should be perfect portion of a sphere. Deviations include (a) flattened heads, and (b) irregular shaped heads.

4. Femoral necks which have been nearly obliterated with exostosis filling in from the femoral head to the major trochanter of the femur.

Summary

This interim report of a long-term project of elimination of coxafemoral dysplasia and

obvious lameness in older dogs of a working breed due to hereditary skeletal structural defects suggests that by carefully laid plans of examination of puppies and older dogs, identification of those exhibiting abnormalities, and eliminating these from the breeding, and selection of normal animals only for breeding will ultimately eliminate this undesirable defect common to a number of breeds of dogs.

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Ethopropazine* in the Control of Chorea of Dogs

J. DAVID SCHAFFER, B.S., D.V.M.,
Brunswick, Georgia

Ethopropazine is an orally effective antiparkinsonism drug which exerts a profound influence upon the neuromuscular syndrome of Parkinsonism. Most of the symptoms of Parkinsonism — rigidity, spasm, tremor, sialorrhea, oculogyric crises, and festination — respond to this therapy. In human medicine it is highly effective either alone or in combination with such drugs as atropine, stramonium, dextroamphetamine, and the antihistamines. Appropriate combinations increase the efficacy of ethopropazine. Because of the symptomatic similarity of Parkinsonism to chorea, clinical studies were conducted with this agent to determine what role it might have in veterinary practice.

Human Studies

An investigation of several extensive studies in the human field revealed certain results which might be projected into our veterinary studies. Doshay,[1,2] of the Parkinson Clinic at Columbia University, has reported on 147 patients with paralysis agitans. All patients were chosen because of their symptoms of rigidity and tremor which had failed to respond to other drugs. It was concluded that ethopropazine treatment effected a highly selective action against major tremor and that it was more effective against this symptom than other drugs currently tested. It was also beneficial in controlling minor tremor and rigidity. Other investigators[3] have reported the drug to be relatively nontoxic and to be seemingly beneficial to the tremor component of Parkinsonism. Other studies by Agate and Timberlake[4,5] contain information of further interest and value to veterinary studies.

*Parsidol — Warner-Chilcott Laboratories, Morris Plains, N. J.

Veterinary Clinical Studies

Parsidol* (brand of ethopropazine) was used in tablet form only. It was available in 10, 50, and 100 mg. potency. For the average size dog (25-35 lb.) 100 mg. was given three times daily, other size dogs in proportion.

To date we have used this product in over 25 cases affected with or recovering from distemper or distemper-like diseases. The animals presented the usual involuntary movements of one or more parts of the body. Treatment was usually continued for seven to ten days, during which time all other indicated therapy in such cases was employed. Parsidol was principally included to symptomatically manage the involuntary movement which often hinders and retards recovery. In selected cases, the chorea was successfully controlled or significantly reduced and no side effects of any type were noted. During our studies, comparative tests were also made with two available brands of mephenesin. In each instance parsidol proved superior. For future consideration, this writer advises that cases selected for treatment be those that have survived the febrile stages of the distemper complex rather than the violent ones with high fever present. Particularly favorable results can be anticipated in cases which have been discharged as "recovered" from viruses, and which are returned one to three weeks later with chorea.

Other investigators have applied this medication in other nervous disorders and found it to be efficacious in controlling and preventing convulsions in dogs.

Tolerance

Parsidol has a low toxicity for man. The ld_{50} in the mouse is 650 mg./kg. orally and 450 mg./kg. subcutaneously. In chronic toxicity tests with dogs 25 mg./kg. five times weekly for as long as ten months produced no harmful effects on the tissues and induced no pathologic changes in the blood. Clinically, tolerance was satisfactory.

Pharmacology

Parsidol has been demonstrated to have several pharmacological actions including:

1. Depression of the central nervous system.
2. Antispasmodic (parasympatholytic) action.
3. Some antihistaminic activity.

Its action as a central nervous system depressant is probably the reason for its effectiveness in nervous disorders.

Discussion and Summary

Parsidol is used successfully to control tremors, spasms, and involuntary movements associated with Parkinson's disease in man. Since chorea in animals presents a similar clinical picture, although probably dissimilar etiology, parsidol was used and with good results in suppressing involuntary palsy-like movements of dogs in selected cases. This effect is due to the ability of the drug to depress the central nervous system.

In the human field, the benefit of parsidol has been improved in selected cases by combining it with other drugs. Different combinations, but with the increase in benefits, were derived from the combination of parsidol with paxital,** a new animal tranquilizer. Examples of such combinations were used in cases of strychnine poisoning and tetanus. Tolerance is satisfactory and no side effects were noted by this writer.

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Most Popular Dog

A total of 430,900 dogs of 106 breeds were registered in the American Kennel Club, according to press release of the Gaines Dog Research Center.

A.K.C. registrations are accepted as an index to how various breeds stand in public favor. For 1956, these indicate that the perky little Beagle rates American favorite with a registration of 69,432; more than twice the number of Boxers (second highest) registered. The remaining breeds of the ten most popular, in order of numbers registered, are as follows: Dachshund, Cocker Spaniel, German Shepherd, Chihuahua, Poodle, Collie, Boston Terrier, and Pekingese.

**Paxital — Product of Warner-Chilcott Laboratories, and in studies mentioned here, was employed mainly in its injectable form.

Canine Parasitism in the Detroit, Michigan Area

R. M. STONE, D.V.M., Detroit, Michigan

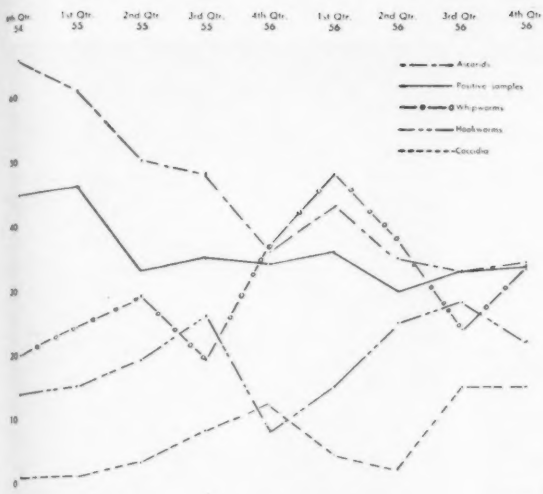
The most common problem in our practice has been that of coping with internal parasites. Recently, in the course of observations, an apparent increase in the numbers of positive stools was noted. This became the basis for compilation of data at this clinic. There are several interesting observations that were revealed in the results. There were 1,198 fecal specimens examined by the sugar flotation method between the periods of October 1954 and December 1956. Direct smears, obtained by rectal thermometer, were not included in the results, nor were those animals in which tapeworm segments were found around the rectal area counted as positive.

Summary of Results

Table 1 is a complete compilation of data formulated from microscopic examination. Time periods were divided into quarters. The increase in the number of specimens examined corresponds with the realization that parasites are being incriminated in more and more cases of gastroenteritis, tonsillitis, eczematous conditions, neurological disorders, and anemia. The first two quarters reveal a slightly higher percentage of positive examinations than the remaining seven quarters. This is probably due to the more conservative choice of patients, since only those patients that were clinically ill at presentation were examined. The seven remaining positive groups ranged between 30 and 36%; two quarters being 33%, two at 34%, one at 35%, and one at 36%. Another interesting observation was that although the number of positive examinations remained more or less constant, there was a variance in the percentage of the different types of parasites found.

Variation of Incidence

Ascarids. There was a constant decline in the percentage of samples containing ascarid ova during the two-year tabulation, with the exception of the fourth quarter of 1956, where the number rose and then continued to fall. (See chart). This, we like to feel, is the result of our constant and firm refusal to vaccinate any puppy for distemper unless the patient has been checked for parasites and treated if necessary by the veterinarian of the seller or by us after presentation of the patient. This recommendation is made, whenever possible, when



Percentage of positive fecal examinations.

the client-to-be consults us by phone before acquiring a new pet.

Coccidia. The interesting analyses of this graph reveals the increase in the percentage of coccidia the last two quarters of 1955 and 1956. In checking individual records of patients, it was also observed that all cases involved were from individuals under one year of age, and that with one exception, all animals were purchased from kennels, supposedly of good reputation. All animals were purebred except for the one exception which was a mongrel terrier, acquired from a private residence in which the family pet had whelped, the result of an unplanned breeding.

Hookworms. This parasite remained more or less constant percentagewise in the tabulations, and no significant conclusion could be reached. This in itself might be an indication of the constant problem the parasite presents. We have experienced a good number of these cases which required several treatments to bring under control. This is probably due to their ability to reinfect the host easily, thus posing a problem.

Whipworms. It appears that this particular parasite shows the widest variance of infection, ranging from 18 to 48% at different quarters. In several cases, the parasite has been refractive to vermifuges regardless of the course of treatment. To date, there are several cases in our practice, all Springer Spaniels, and all unrelated, which are still parasitized; everything short of cectomy has been tried.

Tapeworms. The low incidence of tapeworm infection recorded (not on graph) is due to the difficulty of positive identification by sugar flotation. Thirty-eight individuals besides those in this graphic compilation were diagnosed by visual examination of the rectal area. This parasite can also prove exasperating in attempts to remove it.

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To create knowledge is the province of the investigator; to disseminate knowledge is the responsibility of all agencies capable of interpreting and processing knowledge to functional levels.—*Robert Graham, D.V.M.*

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TABLE 1. Summary of Results of Fecal Examination

	4th Qtr. 54		1st Qtr. 55		2nd Qtr. 55		3rd Qtr. 55		4th Qtr. 55		1st Qtr. 56		2nd Qtr. 56		3rd Qtr. 56		4th Qtr. 56	
Examinations	64		76		73		71		89		110		205		221		289	
% Positive	45		46		33		35		34		36		30		33		34	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Ascarids	23	66	28	61	16	56	18	48	12	37	15	44	24	35	22	33	30	29
Hookworms	5	14	7	15	6	19	10	26	3	8	5	15	17	25	19	28	22	22
Whipworms	7	20	11	24	9	28	7	18	12	37	13	48	26	38	16	24	34	33
Coccidia	0	0	0	0	1	3	3	8	4	12	1	3	1	2	10	15	15	15
Tapeworms	0	0	0	0	0	0	0	0	2	6	0	0	0	0	0	0	1	1

American Animal Hospital Association Sheraton-Palace Hotel San Francisco, California May 8-11, 1957

Program Chairman Dr. Norman L. McBride has advised that the Committee on programing the annual meeting of the A.A.H.A. has approved program arrangement for the forthcoming San Francisco meeting. New information on current problems of interest to those engaged in small animal practice is promised.

A golf tournament has been arranged again this year for Tuesday, May 7; the following day will be devoted to members only sessions to act on committee reports and transact such business as may come before the group. One important function of this closed meeting is action concerning membership applications.

The literary program will open on May 9 with presentation for the first time at this meeting of two special awards: Gaines Veterinarian of the Year Award, and the Mark L. Morris Foundation Award. Two important papers on distemper immunization will complete the program for the first session.

Television and rostrum presentations will follow to the adjournment hour at noon on Saturday, May 11.

Social activities, aside from the golf tournament, include sightseeing tours of the picturesque host city, and the president's reception and banquet. Dr. Karl F. Meyer, formerly director of the William Hooper Foundation, has been engaged as banquet speaker.

All veterinarians interested in pet animal practice are invited to attend this meeting and participate with members in deliberations in the literary sessions. Dr. James H. Yarborough, Miami, Fla., president, will preside at this meeting. He will be succeeded by Dr. Joseph A. S. Millar of Deal, N. J.

For further information or programs address Dr. Wayne H. Riser, executive secretary, 5335 Touhy Ave., Skokie, Ill.

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Chinchillas have been selected by the University of Connecticut Department of Animal Disease as experimental animals for lung cancer research. Microbiological similarity of a sizable group of chinchilla lungs suggested the use of these fur bearers for further studies in the field of pulmonary adenomatosis.

Dr. Joseph A. S. Millar, VP '28, practitioner, Deal, New Jersey will succeed President James H. Yarborough, Miami, present incumbent at the 1957 meeting of the A.A.H.A. to be held in San Francisco, California, May 8-11, 1957.

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Allergic Manifestation in a Dog

An inquirer recently wrote about "swelling of the face" in a four-months-old puppy. Specifically it was observed that eyelids, ears, and lips were swollen and sometimes other parts of the body were affected. In the communication it was stated that itching was apparently intense as the animal rubbed vigorously the affected areas. In our opinion this is an allergy, not anaphylaxis, because the latter is more specifically the sequence of parenteral entrance into the sensitized tissues of a foreign substance; the former, that is true allergy, is usually a histamine reaction. At any rate the injection or administration of an antihistamine results in prompt relief — some patients recover spontaneously in a few hours. The exact allergen responsible for the condition is not known; the consensus is that it is either of a contact or alimentary nature. In horses the comparable condition is usually diagnosed as urticaria. — *R. R. Dykstra, D.V.M.*

Experiments With Yeast Antibiotic On Pigeons And Rabbits Having Secondary Bacterial Septicemia Due To Infection By Coccidia

L. F. WHITNEY,* V.M.D. and R. ARCH,** V.M.D.,
New Haven, Connecticut

IN late summer 1956 breeders of rabbits and pigeons in this area were having considerable loss in their stock due to coccidiosis. One breeder lost 67 of 300 quite expensive homing pigeons during a brief period. Sick animals and birds were sent to our laboratories for examination and for testing the effect of yeast antibiotic.

Materials and Method

Clinical observation revealed severe diarrhea and tympanitis in affected rabbits. Postmortem examination revealed severe intestinal catarrh. Mucous membranes were red and swollen and in some instances ulcerated.

Sick pigeons exhibited loss of appetite, persistent yellow ochre and green diarrhea, intense thirst, prostration, and in addition some birds appeared to suffer respiratory difficulties. Autopsy disclosed visible inflammation of the mucous membrane throughout intestines (particularly severe in the duodenum), enlargement of the mesenteric lymph nodes, and congestion of blood vessels. For detection of coccidial oocysts the flotation method was used. Feces of rabbits and pigeons were collected on parchment paper placed under cages. About 2 gm. of feces were placed in a 50 ml. beaker, suspended in 10 ml. of saturated sodium chloride, and examined after 20 minutes. Three drops were taken from the surface of the liquid from each beaker by a special wire loop and placed on a slide for examination under the microscope. The degree of infection was expressed in number oocysts. Results of these examinations disclosed the following coccidial species: From pigeons, *Eimeria pfeifferella* and *E. avium*, var. *columbae;* from rabbits *E. perforans* and *E. media.* Using the method described, the number of oocysts varied in different samples from 35-100. The degree of infection was

graded as heavy, 50 or more oocysts in 1 drop; medium 25-50; slight 1-25. Bacteriological examinations were performed with feces and with samples of blood. Feces for the tests were obtained postmortem from the intestine of rabbits and pigeons. For bacteriological investigation of the blood animals were bled under aseptic conditions; in rabbits the blood was taken from the ear vein and in pigeons from the axillary vein. Samples of feces and blood were inoculated in the following media: Infusion heart broth, S-S media, thioglycolate broth, liver broth, and Saboraud's media; cultures were incubated under aerobic and anerobic conditions, some at 37 C.; others at room temperature at 25 C., and subsequently were transferred to blood or plant agar.

In some sick rabbits and sick pigeons bacteria were isolated from blood and identified as follows: *Micrococcus pyogenes,* var. *aureus,* hemolytic and non-hemolytic, *M. pyogenes,* var. *albus, E. coli, B. mesentericus, B. subtilis,* coliform bacilli, and some diplococci.

In the present investigation in sick rabbits and pigeons we did not find, in the samples of intestinal content or blood, any pathogenic bacteria such as Salmonella, Pasteurella, Erysipelothrix, Pseudomonas, Clostridia, or any fungi. Results of this work disclosed that sick rabbits and pigeons sent to us (at the end of the summer) were heavily infected with coc-

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TABLE 1. Treatment of Pigeons with Septicemia by Intraperitoneal Injection of Yeast Antibiotic

Injected with malucidin	16/18	negative blood culture / total number
Control injected with saline	6/6	positive blood culture / total number

TABLE 2. Treatment of Rabbits with Septicemia by Intraperitoneal Injection of Yeast Antibiotic

Intraperitoneal injection of malucidin	7/9	negative blood culture / total number
Intraperitoneal injection of saline	5/5	positive blood culture / total number

cidia; some of them developed secondary bacterial septicemia caused by saprophytic species of organisms.

In the present work, we studied the effect on bacterial septicemia of a yeast antibiotic — malucidin® prepared and described by Parfentjev.[1] In these tests, two preparations were used: (1) Malucidin preparation, crude yeast extract containing 0.5% of yeast protein with antibiotic properties and 20% soap; (2) isolated and purified yeast protein with antibiotic properties designated as "yeast antibiotic" (malucidin). In addition, effects of treatment by yeast antibiotic on coccidial infection were recorded.

Experimental

Eighteen pigeons with septicemia were injected intraperitoneally with malucidin on two consecutive days, receiving each time 3 mg. of this product dissolved in 2 cc. saline. Forty-eight hours after the second injection a sample of blood was withdrawn for bacteriological examination. In 16 of 18 treated blood became sterile. For controls, six pigeons in which septicemia was demonstrated were injected intraperitoneally twice with 2 cc. of saline. Injection of saline had no effect on the septicemia.

The results of this test are shown in table 1.

Similarly, nine rabbits with septicemia were injected intraperitoneally on two consecutive days, each time with 5 mg. malucidin dissolved in 2 cc. saline, and 48 hours after the second injection, blood was tested for the presence of bacteria. In seven of nine rabbits blood cultures were negative. As controls, five infected rabbits were injected intraperitoneally twice, each time with 2 ml. of saline. Samples of blood taken in control rabbits 48 hours after the last injection of saline gave positive blood cultures. Results of these tests are shown in table 2.

A similar experiment was performed with 20 rabbits: Ten rabbits were twice injected intraperitoneally with yeast antibiotic as described above. Malucidin preparation having 80% of crude yeast extract and 20% soap, each time 10 cc. diluted 1:1, was administered intrarectally to ten other rabbits. The results of these tests are shown in table 4.

In these experiments it was observed that the sterilization of blood by injection of malucidin was accompanied by a reduction in the number of oocysts of coccidia in the stools. In another experiment, 36 pigeons were injected with yeast antibiotic as described above, and six controls with saline; stools were taken for examination 48 hours after the second injection.

In no animal treated by injection or intrarectally was there any sign of toxic effect. After treatment with yeast antibiotic, clinical improvement was noticeable. Particularly dramatic was the rapid disappearance of tympanitis. Of the treated pigeons and rabbits, not one died. It should be mentioned, however, that treatment by yeast antibiotic did not have any effect on the respiratory difficulty present in a few of the pigeons. None the less, general health of these birds was markedly improved after treatment.

TABLE 3. Effectiveness of Yeast Antibiotic in the Treatment of Coccidiosis in Pigeons

No. pigeons	Oocysts before treat.		Yeast antibiotic injection	Saline injection	Oocysts after inj.				No. cases with positive results*
	heavy	slight			more	same	less	disappeared	
36	8	28	36	—	2	9	18	7	25 (69%)
6	1	5	—	6	1	5	—	—	none

*In cases with positive results the number of oocysts in the stools diminished by ½, or in some birds disappeared.

TABLE 4. Effectiveness of Malucidin in the Treatment of Coccidiosis in Rabbits

No. rabbits	Oocysts before treat.			Malucidin inj. i.p.†	Malucidin prep. adm. i.r.††	Oocysts after treat.				No. cases with positive results*
	heavy	medium	slight			more	same	less	disappeared	
10	5	3	2	10	—	—	1	7	2	9 (90%)
10	4	2	4	—	10	—	2	4	4	8 (80%)

†i.p. = intraperitoneally
††i.r. = intrarectal.
*In the last experiment with positive results the number of oocysts in the stool diminished by more than ½ and in some animals disappeared entirely.

Discussion

The pathogenic effects of coccidia resulting from mechanical injury to the intestinal epithelium and resulting secondary infection by bacteria from the intestinal content were described by Hutyra and Marek.[2] We have found the same condition in pigeons and rabbits heavily infected with coccidia.

Yeast antibiotic treatment of septicemic cases results in negative blood culture of most of the pigeons and rabbits.

Although some indication of the beneficial effect of yeast antibiotic in the treatment of coccidiosis was observed, more work needs to be done. Several papers have been published indicating the value of sulfonamide and antibiotics in the treatment of coccidiosis, although some studies have shown that the oocyst count was not depressed by these drugs (Whitney and Whitney).[3] Our present studies suggest that the improvement noted by some authors could be due to the blood sterilization. Apparently in the treatment of coccidiosis the application of antibiotics may have its place.

Summary

Pigeons and rabbits from lofts and farms where the animals and birds were clinically ill with coccidiosis were studied as to oocyst count and the effect of the infection upon septicemia. Also studied was the effect of the yeast antibiotic, malucidin, upon coccidiosis and blood bacteria.

In many cases of coccidia-infected animals, infection of the blood with saprophytic bacteria was noted. In rabbits, considerable tympanitis accompanied infection.

Two doses of the yeast antibiotic — malucidin—appeared to sterilize the blood of most of the animals, and also showed some effect on coccidia, and quickly reduced tympanitis in the rabbits. No toxic effects were observed and rapid improvement of the pigeons and rabbits was the rule.

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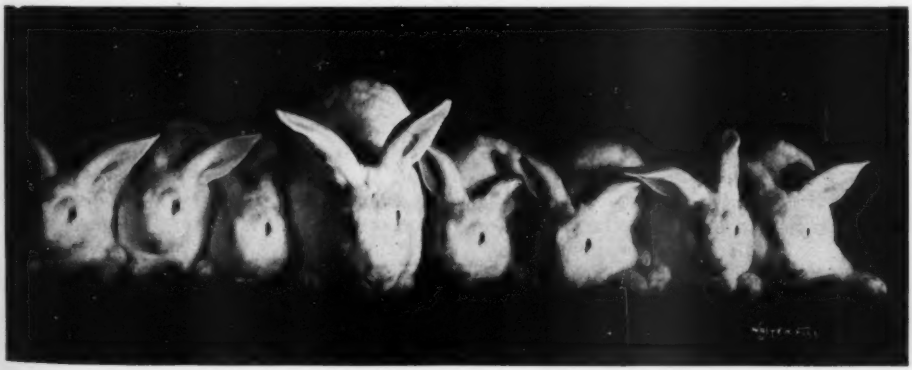

CLINIC

CLIFFORD L. McGINNIS, D.V.M.

Peoria, Illinois

A telephone call from a client described a "chopping" or "chewing fit" in her young dog that has been going through a siege of distemper. This prompted me to discuss some observations on this disease.

In spite of the years of progress and understanding of pathological processes and improved prophylactic agents, the number one problem in small animal practice continues to be canine distemper and its complications. No disease of dogs can cause more havoc in the hospital or in a kennel than the undiagnosed case.

An owner places a puppy on the examination table and says, "Doctor, this dog has coughed for a couple of days, especially when he plays or is active. I think he caught cold when he got his feet wet in the snow the other day. He doesn't feel quite up to par either and isn't eating well."

Body temperature is noted to be elevated three or four degrees and the tonsils severely inflamed; but the puppy is alert. Now maybe it is just a "cold" because we see dogs exhibiting similar signs every day. Recovery is the rule under proper treatment if a bacterial infection of the upper respiratory passages is the only thing involved.

Right or wrong, we diagnose most of these cases as distemper, give the prescribed dose of antiserum, start them on one of the antibiotics and place them in the distemper ward if the owners wish to have the animal hospitalized.

Some of my colleagues do not hospitalize distemper cases which creates a different problem. Many young dogs are presented with the history of diarrhea for two or three days. Questioning reveals the appetite to be good and the general appearance suggests nothing but a simple digestive disturbance. Temperature may be elevated from 101.5 to 102 F. The client always wants to hospitalize this type of case because he or members of his family are tired of cleaning up the basement. They want someone else to do it for a while.

So you diagnose it as simple gastroenteritis, place it in your noncontagious ward and with medication correct the diarrhea in two or three days and send this puppy home with a suggested corrective diet. All goes well for two or three weeks, and then the owner frantically phones that the dog is having a "fit." It is then that you realize that the simple gastroenteritis was not so simple and that now the puppy presents a well developed case of encephalitis, probably the result of distemper you called gastroenteritis. You recall that you also had in adjacent cages two or three other puppies that became ill while in the hospital at the same time. All had serum protection.

For the above reasons, we give a dose of killed tissue vaccine as a booster to young dogs that are to be hospitalized, providing they have had previous distemper vaccine. To susceptible pups, we continue to give antiserum. There is some question if the cost of antiserum is justified when measured against the protection it affords. In our city, hyperimmune serum has not proved too effective against the particular strain of canine distemper virus that attacks our dogs.

Twenty-five years ago, we saw a lot of distemper both in vaccinated and unvaccinated dogs. We administered ammonium chloride, arsenic, strychnine, dextrose, whole blood, oxygen, kaolin, pectin, mucilaginous preparations, hydrochloric acid intravenously, and dozens of other preparations. Dogs died from pneumonia, nephritis, and enteritis but not many from brain disorders. This may be because they didn't live long enough to develop nervous symptoms. Then came the sulfonamides, then antibiotics, and B complex vitamins to keep dogs eating, until today, our death loss is almost entirely from encephalitis. Though no carefully computed data are available, I am inclined to believe that mortality rate has changed little over the past 20 years.

Our present method of distemper immunization has given us better results than those previously employed. For years, we gave antiserum every two weeks until the puppy was four months of age. Three doses of tissue vaccine at two and four week intervals followed the serum series. Our next trial with several types of vaccine was disappointing.

Now we give distemper and hepatitis tissue vaccine intradermally when the puppy is eight weeks of age and again at ten weeks. After a month's interval, we give a dose of attenuated vaccine. We charge the same fee for all three doses and advise a booster when the dog is one year of age. We have used this method on 423 dogs to date with gratifying success.

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(Continued from page 234)

together with penicillin and streptomycin when instilled in infected quarters cause a more rapid reduction of inflammation than do products containing antibiotics alone. Thus, metibiotic which combines (a) the effective antibiotic combination of penicillin and streptomycin, (b) the advantages of a self-emulsifying vehicle for sustained antibiotic persistence in the udder after instillation, and (c) the powerful anti-inflammatory action of meticorten acetate has obvious advantages for the treatment of bovine mastitis.

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An avalanche of approximately 2,000 letters a week complaining about the cancellation of Noah's Ark, a half hour television program featuring two veterinarians, has caused Jack Webb, the producer, to reconsider a continued series on another network. The popular series was cancelled early in March.

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Pasture and stock rotation is recommended to counteract the effects of internal parasites of livestock.

Farm Animal Population

The United States Department of Agriculture is the source of census of farm animal population as of January 1, 1957 by states tabulated in *Feedstuff* for March 16, 1957.

A total of 95,166,000 cattle (including calves) represents a decline of 1,638,000 since January 1956. Texas leads in total number reported — 7,736,000 head. Wisconsin and Minnesota rank first and second respectively in numbers of dairy cows over two years of age.

Largest number of hogs, 10,790,000, are located on Iowa farms. Illinois and Indiana census figures show 6,348,000 and 4,520,000 porkers respectively in those states ranking in second and third place. Total swine census for United States, 52,207,000. There are 370,000 fewer horses and mules on American farms than last year, or a total of 3,558,000.

Poultry is the only class of livestock showing increased numbers for 1957 over 1956. Approximately 10,000,000 more chickens are reported for a total this year of 392,811,100, all classes. The turkey census revealed a total (all kinds) of 5,745,000, also increased by 822,000 over a year ago.

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Old World Disease Plagues Threatened Health of Modern Man

In his lecture presented at the National Institutes of Health, Bethesda, Md., Dr. Karl F. Meyer, director emeritus of the Hooper Foundation of California's Medical Center, San Francisco, stated that the threat of nation-wide, even world-wide epidemics similar to the Old World plagues exists today.

He pointed out that bubonic plague, probably residue of Asiatic infection, exists in rodents of the Southwest and West, and psittacosis are examples of those diseases that could break out under favorable circumstances. Protective vaccination of everyone in the world would not insure disappearance of many diseases that have alternate hosts among lower animals.

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The major effort of low-level parasitism in livestock is depression of weight gains. In a study of mixed infection with gastrointestinal parasites, for example, cattle treated with a suitable anthelmintic gained from .06 to 0.40 lb. per day more than comparable untreated animals.

A Review Of The Newer Developments In Edema Disease Of Swine

D. W. GREGORY, B.S., M.S., D.V.M., Washington, Iowa

AN understanding of the etiology of edema disease, a perplexing condition that has vexed the swine raiser and veterinarian alike, is slowly being accomplished. Timoney[1] (1950) was apparently the first to reproduce symptoms and lesions associated with this condition by injecting test pigs with fluids derived from the intestinal contents of edema disease carcasses. This accomplishment proved that toxic and edema producing substances were present in the intestines of field cases, but not in the intestines of normal pigs or in those involved in experimental edema disease.

Evidence that edema disease is a specific toxemia was presented by Gregory[2] in 1955. It was noted that hemolytic coliform organisms (subsequently proved to be hemolytic *Escherichia coli*) were present constantly in the small intestines of affected animals, and that supernatants of broth cultures of these organisms were toxic for pigs and apparently capable of producing lesions. It was also noted that hemolytic coliforms generally did not appear in intestinal cultures prepared from healthy pigs. In a subsequent paper, Gregory[3] submitted further evidence that hemolytic *E. coli* are involved in edema disease, and called attention to the similarity between this natural condition and the symptoms and lesions observed in small laboratory animals injected parenterally with Enterobacteriaceae endotoxins.[4,5] A speculative hypothesis of a possible mechanism involved in the production of edema disease was advanced.

Additional evidence that edema disease is a specific toxemia was introduced by Timoney[6] in 1956. This writer demonstrated that disease producing factors in the intestines of affected pigs are antigenic, and that antiserums prepared from pigs injected with intestinal content materials are protective in experimentally induced edema disease. Timoney also prepared an antiserum with a hemolytic coliform organism isolated from a sick pig. This serum protected pigs against the effects produced by the intravenous injection of potent bowel content supernatant.

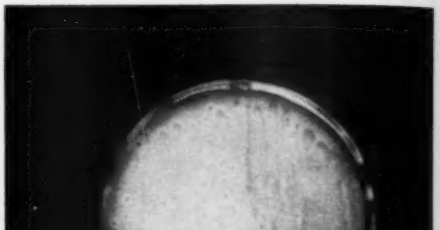

Fig. 1. Blood agar plate (transmitted light). Beta hemolytic *Escherichia coli* compared with nonhemolytic type. The left half of the plate was seeded with the hemolytic culture.

The above would appear to indicate the probable usefulness of *E. coli* antigens and antisera for control. However, *E. coli* is not a single species in the same sense that the term is applied to some other organisms; for example, *Salmonella pullorum*. It is an oddity of current bacterial taxonomy that the over 200 types of the genus Salmonella are each endowed with species rank while the members of another large group of bacteria are collectively or individually called *E. coli*.[7] In the *E. coli* group there are over 125 known O antigen groups and at least 75 K antigens. These O antigen groups and K antigens, commonly referred to as somatic antigens, are serologically distinct. The O antigens are antigenic substances found in the bacterial bodies while the K antigens occur as envelopes or capsules surrounding the bodies.[8]

It is well substantiated that certain *E. coli* types are involved in epidemic gastroenteritis of human infants.[9] To the writer's knowledge the types incriminated are all endowed with a variety of K antigen known as B antigen, but

the mechanism by which these strains produce diarrheal disease has not been elicited. It has been the experience of the writer that a number of different O antigen groups of *E. coli* are involved in edema disease, and the problem of antigen diversity might profitably be compared to the problems encountered with the many serotypes in Salmonella infections of turkeys. Whether any of the known antigen components or whether some other factors elaborated by certain *E. coli* strains are involved is not as yet known. Experimentally, the toxic manifestations of enteric bacteria are with one exception, *Shigella dysentariae*, apparently due to the toxicity of the somatic antigens. The writer has not been able to demonstrate antigenicity on the part of the hemolytic factors elaborated by several hemolytic *E. coli* strains. In the event that the edema disease producing factors found in or produced by certain *E. coli* strains are antigenically similar, it seems probable that pigs can be protected, at little expense, against the ravages of this disease.

Within the last two or three years the term enterotoxemia has been commonly applied to edema disease. What expression will eventually prevail as a name for this condition is not known, but it does seem to the writer that enterotoxemia is unsuitable. Enterotoxins were formerly considered to be soluble toxic materials produced by living bacteria which are capable of exerting deleterious effects on the intestinal mucosa. In the field of veterinary medicine enterotoxemia is currently used in such broad fashion that it would be difficult if not impossible to define. The word is frequently used for want of a better term in conditions where diagnosis is uncertain. It seems to the writer that should expressions such as gut edema or edema disease be considered inadequate or distasteful, perhaps *E. coli* toxemia would be appropriate. This has etiological significance and is somewhat descriptive of the symptomology.

Fig. 2. Photo of same plate as fig. 1 taken by reflected light. Hemolytic culture on left side.

Subsequent to the acceptance of the above paper for publication, two additional papers on the relationship of hemolytic E. coli *to edema disease have appeared. These papers, Hemolytic* Escherichia coli *and Oedema Disease of Pigs by R. G. Erskine, W. J. Sojka, and M. K. Lloyd, and The Experimental Reproduction of a Syndrome Indistinguishable from Oedema Disease, are found in vol. 69, pages 293-301 and 301-303, respectively, of the March 2, 1957 issue of* The Veterinary Record.

The authors of these articles isolated 77 hemolytic E. coli *strains from cases of edema disease. Of these, 61 were "typable" with an antiserum prepared from one strain, seven were "typable" with an antiserum prepared from another strain, and nine were not "typable" with either of the antiserums.*

Using extracts prepared from hemolytic E. coli *edema disease isolated, the writers produced lesions and symptoms indistinguishable from those seen in field cases. Excellent photographs of experimentally produced lesions accompany the second article.*

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Sound pest control methods are valuable, according to Dr. Edward G. Batte, parasitologist of the California Spray-Chemical Corp. Actual records reveal that on the average a rancher can make $1. for every $1. spent on livestock insect pest control.

A Bacterin For The Prevention Of Shipping Fever In Canada

G. R. CARTER,* D.V.M., M.S., D.V.Sc., Guelph, Ontario, Canada

FOR a good many years Pasteurella bacterins have been employed in an attempt to prevent shipping or transit fever of cattle. It is generally felt that the bacterins in use at present are of dubious value. Because of the nature of shipping fever it is doubtful if a highly satisfactory preventive agent will be found. However, the least that can be done is to prepare bacterins in a manner consistent with the latest information on this disease. Sufficient data are now available in Canada to warrant changes being made in the constitution of the shipping fever bacterins. The expression "shipping fever bacterin" has been employed rather than "hemorrhagic septicemia bacterin" because it has been found in Canada that shipping fever is essentially a bacterial bronchopneumonia and not a hemorrhagic septicemia of the kind seen as an epizootic in Asia.

A great deal of confusion and controversy has arisen concerning the cause and nature of shipping fever. The writer's views on this disease were presented in a recent discussion.[1] With some modification they are as follows:

1. There is a viral pneumonia of cattle — perhaps more than one — that resembles somewhat virus pneumonia of pigs. This pneumonia is widespread in the cattle population. An examination of more than 100 lungs taken from veal calves at slaughter in southern Ontario has shown that more than 10% are affected. The incidence of this enzootic pneumonia is no doubt just as great in calves in western Canada.

2. Some but not all of the enzootic pneumonia lesions are infected by *Past. multocida*. Under circumstances of stress latent disease frequently becomes active disease. No doubt many of the uncomplicated viral lesions become secondarily infected under circumstances of stress and constant exposure to virulent strains of *Past. hemolytica* and *Past. multocida*.

3. The viral infection by itself, as in virus pneumonia of pigs, is usually a low-grade infection. Even when the virus is present in shipping fever pneumonia it would appear to play a role secondary in significance to the Pasteurella. This fact is suggested by the frequency with which shipping fever may be treated adequately with sulfonamides.

4. There is now experimental evidence that *Past. hemolytica* is capable of producing mild infections in calves that have not been deliberately stressed.[2] Whether or not *Past. hemolytica* can by itself produce a bronchopneumonia of the kind seen in shipping fever is not known.

The bacterin that has been employed experimentally in southern Ontario consisted of 50% *Past. hemolytica* and 50% *Past. multocida* type A. This composition was based upon the results of bacteriological examinations carried out over a number of years. Some of this information was contained in previous reports.[3,4] There would appear to be no apparent pathological or bacteriological difference between the bronchopneumonias that occur in shipping fever and those that occur without having necessarily a history of shipment. For this reason the results of the bacteriological examinations of a small number of cases where shipment was not involved have been included.

The observations reported in this communication are in substantial agreement with those of Rice and colleagues.[5] It is of interest that

TABLE 1. Identity of Pasteurella Strains Recovered from Cattle with Shipping Fever and Pneumonia

	Origin	Shipping Fever	Pneumonia	Type
Past. hemolytica	Ontario	51	1	*
	Alberta	0	5	
Past. multocida	Alberta	0	1	D
	Alberta	0	8	A
	Iowa	0	1	A
	Ontario	10	11	A
	Quebec	0	1	A
	Ontario	0	1	Not typed

Totals *Past. hemolytica* = 61; *Past. multocida* = 29.
*Serologically homogeneous. *Can. Jour. Microbiol.* 2:483, 1956.

*Department of Research, Ontario Veterinary College.

these workers noted that some shipping fever pneumonias resulted from mixed infections of *Past. hemolytica* and *Past. multocida*. Further, they found that cattle from western Canada frequently developed antibody levels against *Past. hemolytica* and *Past. multocida* after shipment to eastern Canada. Serological evidence obtained by the complement-fixation test indicated that of the strains of *Past. multocida* involved, the type C varieties were the most frequent. Because of the strong serological cross-reactions between types of *Past. multocida* the author has felt that for the present the composition of the bacterin should be based upon actual bacteriological findings.

The recent work of Berman[6] indicates that injections of bacterins containing type C and D strains of *Past. multocida* may elevate titers for *Brucella abortus* in cattle that have previously received strain 19 vaccine.

Prevention of Shipping Fever

It is extremely difficult to test whether or not a bacterin or antiserum contributes to the prevention of shipping fever. A large scale trial carried out recently in Canada[7] suggested that one inoculation of a *Past. multocida* bacterin was superior to one inoculation of a conventional *Past. multocida* antiserum as preventive of shipping fever. The experimental shipping fever bacterin referred to above and containing 50% of *Past. hemolytica* and 50% of *Past. multocida* type A has been employed in native Ontario cattle for the prevention of shipping fever introduced by "show" cattle and "stockers and feeders." The bacterin has been also employed with apparent success in early outbreaks of shipping fever.

Until more experimental data are available the justification for use of this agent is based for the most part upon bacteriological findings in shipping fever and the principle of active immunization.

Considerable care was taken in the preparation of the experimental bacterin. Should this bacterin be prepared commercially consideration should be directed to the following:

1. Only freshly isolated capsulated cultures of *Past. hemolytica* and *Past. multocida* type A should be employed for each lot of bacterin. (Lyophilized cultures of freshly isolated strains can be obtained from the author.)

2. It is well known that short incubation periods favor maximum antigenicity. A six to eight-hour period had been found to produce a satisfactory harvest of organisms.

3. It is not necessary to add more than 0.25% formalin by volume to sterilize the bacterin cultures.

4. The use of an adjuvant such as that employed by Bain[8] should be considered. However, the difficulty of handling a viscous preparation under winter conditions must be kept in mind.

The dosage recommended for the experimental bacterin has been either 5 or 10 cc., with a repeat dose given after an interval of a week. As with all Pasteurella bacterins the risk of anaphylaxis must be appreciated.

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Enterotoxemia in Beef Calves

Results of field trials with dynafac,® a new feed additive developed by Armour & Co. research, containing 20% tetra alkylammonium stearate and 80% steamed bone meal were reported by Dr. Don Mackey, practitioner of Greely, Colo., at the Midwest Feed Manufacturers Association meeting recently at Colorado Springs.

Doctor Mackey outlined results as favorable in a lot of 500 calves weighing 400 to 600 lb. in which an outbreak of enterotoxemia was confirmed. During a 30-day test period no mortality occurred in that group of animals receiving 2 gm. of the new chemobiotic per head daily whereas deaths continued among those held as control. Conclusion was that in general results were encouraging. Treatment appears to have potential for control of this disease, apparently on the increase in some sections.

EDITORIAL COMMENTS

"The Veterinarian Protects Your Health"

Subject theme of one panel of a well-designed display was viewed by 400,000 persons, visitors at the week-long Centennial Exposition of the Academy of Medicine of Cincinnati commemorating the 100th anniversary of the Academy. The veterinary exhibit prepared by the Cincinnati Veterinary Medical Association (below) was rated among the four ranking displays by those in charge of programming and exhibition.

The spacious Cincinnati Music Hall housed 125 of the finest medical exhibits prepared in America by various health groups and organizations within the American Medical Association. Each day throughout the Exposition, the Music Hall Auditorium was converted into a Health Theater where selected motion pictures were shown to acquaint visitors with the complexity of health services in today's world. That the Cincinnati veterinary group took an enthusiastic interest in the invitation of the Academy to exhibit illustrates not only the esteem in which the group is held by local allied professional groups, but gave an excellent opportunity to further veterinary public relations.

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Public Health Traineeships for Professional Health Personnel

The Public Health Service program of public health traineeships for professional health personnel, which was instituted late in 1956 under authority of the Health Amendments Acts, is being continued — and possibly expanded — for the 1957-58 academic year. The Service is now ready to accept application for the coming Fall term. While these may be submitted at any time, they should preferably be submitted by May 1, 1957.

Traineeships under this program are available for training all types of professional public health personnel, such as physicians, dentists, veterinarians, engineers, nurses, sanitarians, and others whose professional skills are required in modern public health practice. Only

specialized public health (post-professional) training is provided, not basic professional preparation. Preference is given to qualified individuals who have had no more than two years experience in public health work, who have had less than one year of graduate or specialized public health training, and who are under 35 years of age. Other factors taken into consideration in selection of trainees are as follows: Geographical distribution, replies received from references; candidate's plans for using the training provided; proposed training program; and shortages of trained personnel in the candidates field.

Stipends covering living expenses for the trainee and legal dependents, as well as tuition and related costs, are included in the traineeship awards. The academic degree held by the individual determines the stipend level. The annual (12-months) amounts range from $2,400. to $4,800., plus allowances for dependents.

Applicants in all professional categories except nursing may secure application forms and additional information from the Chief, Division of General Health Services, Bureau of State Services, Public Health Service, U. S. Department of Health, Education, and Welfare, Washington 25, D. C.

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Product Information from Journal Ads

Several hundred sales, marketing, and research executives of the pharmaceutical industry convened in an all day meeting in New York recently where methods for dissemination of information and promotion were discussed. Panelists of the program agreed, according to *Advertising Age* for Mar. 4, 1957, that announcement of available new products, information on newer pharmaceutical preparation, and sales promotion efforts are presented most effectively to professional readers through journal ads.

Support for this premise was given by Thomas A. Standt, chairman of the Department of Marketing, Michigan State University, who reported that a 1951 study revealed that only 34% of physicians were favorably disposed toward direct mail promotions, as against 70% ten years ago. He recommended that new products be announced through journal advertising. By this method "all doctors will get the message at the same time."

University of Illinois researchers concluded from rather extensive survey that medical publications ranked first as a source of information on new products, with personal contact, and direct mail following in favor in the order given.

Dr. F. P. Kilpatrick, psychologist with National Analysts, Inc., Philadelphia, stated that well-prepared, informative advertising copy rated readership only slightly below that of editorial material. He reported that 82% of doctors read ads and that 80% considered them valuable as information pieces. These general results were reaffirmed in other studies requested by a different periodical.

A direct analogy may be drawn from this interesting analysis. Veterinarians like physicians are busy practitioners. Open-mindedness characterizes most veterinarians, who though they have a degree of confidence in methods and agents employed, are continually alert for something better. They are also conscious of progress of product development and improved tools. It has been demonstrated that drug items developed during recent years have replaced, to a major degree, items formerly employed and dispensed. For these and other reasons medical periodicals have assumed increased responsibility to keep their large audience of readers advised and readers in turn have become even more conscious of the necessity of perusing their professional journals to assure their keeping abreast of developments. They look to their monthly journals for information that will assist in solving local problems.

Most advertising copy in veterinary journals is informative. This publication encourages its advertisers to make it so. Advertising messages to our readers become a permanent part of the day by day, year by year, veterinary record. Placed in a volume these pages are kept for reference and therefore are assured repeated readings. Where detail is voluminous or research reports need detailing, a series of advertising messages may be prepared, so that points of interest may be developed separately. High readership advertising copy in medical and veterinary journals indicating what doctors value most is that "which translates what to use and how much to use."

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Leptospirosis infections, characterized by some practitioners as "soft mastitis," may result in 100% morbidity among a herd of dairy cows. Abortions occur in 15-20% of bovine infection and up to 100% when droves of sows or gilts are attacked.

Laboratory tests are essential to affirm diagnosis.—*H. S. Bryan, D.V.M.*

New Symbol for VETERINARY MEDICINE

Veterinary medicine is one of the world's ancient and respected arts, although a still young science. The scope and content of its march through history have seldom been captured by the historian, and never symbolized in a form pleasing to the eye and appropriate to the subject matter. Now, after years of research, Dr. J. F. Smithcors has not only written a definitive history of the veterinary art, but also directed the construction of the new symbol that will adorn the pages of VETERINARY MEDICINE.

Veterinary medicine has long demanded a distinctive symbol. Fresh ideas have been lacking, however, largely because few veterinarians have submitted themselves to the rigorous prerequisite that of necessity underwrites the ability to have fresh ideas on a matter of such historical importance. In the preparation of his erudite Evolution of the Veterinary Art, to be published this Spring, Doctor Smithcors came face to face with historical facts that provided a springboard to the design reproduced above.

The V was planned to be symbolic of the antiquity of veterinary medicine, retaining some of the flavor of the traditional caduceus, but obviating its common connotations. The popularized caduceus, depicting the staff of Mercury with two twined serpents and wings, has been the symbol of medicine in the United States, general acceptance of which has been cemented into place by the use made of it by various Corps of the Medical Department of the U. S. Army. The traditional symbol of the healing arts, the staff of Aesculapius the physician with a single serpent entwined, the *Coluber longissimus* once held sacred by the Romans, has been long the emblem of the Royal Army Medical Corps (British) and the Royal Canadian Army Medical Corps.

Neither the staff of Mercury, the speedy comer and messenger to the gods, nor the staff of Aesculapius, the physician, seemed appropriate to the veterinary art. For this reason the V itself is the dominant symbol, rather than merely superimposed over either staff. The staff of Aesculapius and the staff of Mercury have both been replaced by a twitch, symbolic of the persistance of a useful idea taken from ancient practice, and of course, a purely veterinary token.

The M was executed as a specific acknowledgement of the contribution of veterinary journalism to the profession, with the lamp of learning at the top of the superstructure of medicine, and the book as a symbol of the most effective medium for the diffusion of knowledge.

Taken together the initials symbolize the past and the present of veterinary medicine. That they should also happen to symbolize VETERINARY MEDICINE, the journal, is a happy and most appropriate circumstance.

Miss Mary Ellen Cross, artist and beauty queen at Michigan State College, has crystallized the ideas suggested by Doctor Smithcors into a pleasing composition.

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Compulsory Federal Poultry Inspection

In response to overwhelming demands from consumer groups and veterinary spokesmen, as well as public health officials, full Senate Committee hearings were held February 27-28, in Washington, on compulsory poultry inspection bills. The editorial stand previously taken by VETERINARY MEDICINE was reiterated in answer to request from Senator Murray, chairman of the Committee. The following telegram was read into the record:

Retel. Submit the following statement concerning proposed legislation on compulsory poultry inspection now being conducted by your select committee: Interests of (1) the consuming public, (2) poultry husbandrymen, and (3) processors of poultry can best be served by adequate compulsory poultry inspection legislation. Consumers must be assured wholesomeness in prepared (slaughtered and drawn) poultry. Husbandrymen will experience increased demand, as will processors, by establishment of consumer confidence in proper inspection to assure healthy birds slaughtered in sanitary plants. The Meat Inspection Branch Agricultural Research Service, USDA, has over 50 years of invaluable experience as a consumer protective organization. Wisdom of acquiring the services of this experienced group made up of trained veterinarians who are best qualified to judge health status of all meat producing animals and birds, and who have earned confidence of consuming public, is unquestionably sound.

Beaudette Veterinary History Collection Acquired by Michigan State University

The fabulous collection of old and rare books on veterinary medicine assembled by the late Dr. Fred R. Beaudette has been acquired for the Historical Library of the College of Veterinary Medicine at Michigan State University.* As one of the notable private libraries of its kind in its own right, the Beaudette Collection, together with present holdings, makes the M.S.U. Veterinary Historical Library one of the outstanding collections at any school in the English speaking world.

The importance of the Beaudette Collection is such that its identity will be maintained, both in recognition of Doctor Beaudette's eminence as a veterinarian, and as a monument to his zeal as a veterinary bibliophile. The significance of the collection may be appreciated both from its size—about 250 distinct items—and from the number of priceless works it contains. Included are three books and three manuscripts dating to before 1500, and 19 other works dated before 1600. An additional 35 works of the 17th century makes a total of 60 items dated prior to 1700. Few collections contain such a wealth of early material. Together with books already held, the M.S.U. Historical Library, including the Beaudette Collection, presently consists of more than 400 items, of which 80 are dated before 1700.

One of the choicest items in the Beaudette Collection is the *Libre Marescalciae Equorum,* 1489 (Book of Equine Medicine), possibly the first strictly veterinary work every printed. Another is a 1492 edition of *De Proprietatibus Rerum* (The Properties of Things), an encyclopedic work by a Franciscan friar, which contains the first printed description of rabies in the dog. Another is a 1482 edition of *Scriptores Rei Rusticae* (Writings on Agriculture), a compilation of the Roman writers on husbandry which includes extensive sections on the veterinary medicine of Roman times. An item of particular interest is an especially fine copy of The Anatomy of an Horse (1683) by the farrier, Andrew Snape. This was Lord Dartmouth's personal copy and has his signature. Both an Italian (1618) and a German (1603) edition of Ruini's Anatomy of the Horse, first published in 1598, are included. A complete listing of the items in this collection would require several pages.

The significance of such a collection goes far beyond its importance as a repository for those works which form the background of veterinary medicine. Being located at a school where an active program of teaching, research, and writing in the area of veterinary history is in operation, the collection will be an important tool in furthering this program. As an outstanding collection on this aspect of the history of civilization, it is anticipated that scholars from other areas may find source material here that is not available elsewhere. It may be anticipated that the development of the subject of veterinary history will parallel that which has transpired in the history of medicine in the recent past. At the present time about half of the medical schools in the United States teach one or more courses in the history of medicine, and a considerable program of research and writing is in effect.

An essential part of any program of teaching and research, of course, is the availability of appropriate source materials. It is significant that the Beaudette Collection will continue to be a useful resource in this respect. A book to be published this Spring, entitled Evolution of the Veterinary Art, will be copiously illustrated with plates graciously supplied the writer by Doctor Beaudette. The Beaudette Collection, as a part of the M.S.U. Veterinary Medicine Historical Library, will be on display (behind glass) and open to qualified scholars.—*J. F. Smithcors, D.V.M., Ph.D.*

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British Medical Association Charges Broken Pledges

A Royal Commission on remuneration of doctors in the British Health Service is announced in the *British Medical Journal* for Mar. 9, 1957. No announcement was made of chairmanship or Commission membership.

Withdrawal of general practitioners from the Health Service has been considered. This has been wrongly described as a threat to strike. Details of the scheme for withdrawal have been prepared and will be published. It appears that there will not develope any lack of patient care yet the entire National Health Service is jeopardized as an institution of government.

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Antibody levels for *Leptospira pomona* are exceedingly high among horses suffering periodic ophthalmia, according to report of experience at the University of Illinois. Researchers believe these observations substantially support Leptospira infection as the cause of this disease.

*Acquisition of the collection was implemented by the M.S.U. Development Fund.

Congratulations to Delaware: State Now Brucellosis-Free

The U. S. Department of Agriculture has declared the state of Delaware modified certified brucellosis-free, the sixth state so designated. This means that not more than 1% of cattle and not more than 5% of cattle herds are infected with brucellosis.

Other brucellosis-free states are: Maine, New Hampshire, North Carolina, Washington, and Wisconsin. In addition there are now 351 counties in 27 other states and Puerto Rico who have earned the disease-free designation. Several states will soon be added to the exclusive list.

Value of the eradication program which was intensified late in 1954 is emphasized by the announcement that annual losses due to the disease have been reduced by $25,000,000. during the past two years.

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Expanded Laboratory-Office Building Louisiana Veterinary Research Center

Pictured below is the Dalrymple Memorial Laboratory, with its new two-story addition, headquarters of the Veterinary Research Center, Louisiana State University, Baton Rouge.

With the addition of laboratory and office space are six separate units referred to as animal laboratories. One of these is for work with diseases of birds, one is designed entirely for rearing of calves off the floor for work with gastrointestinal parasites, a third houses 11 isolation units, a fourth contains 12 individual stalls, and another a general purpose building. A separate incinerator unit completes the group.

These new facilities will make it possible to pursue animal disease problems of immediate serious nature common to Louisiana and adjacent states of the Mid-South.

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"Hazards of Antibiotics"

It is becoming increasingly evident, states Dr. S. S. Schneierson (Hazards of Antibiotics, *Consumer's Reports*, 18:162, 1953), that the indiscriminate use of antibiotics for trivial ailments may gradually build up sensitivity, even in individuals who exhibited tolerance initially, thereby ruling out their use when serious infections might make their employment vitally important. He also states that residual effects of continued consumption of, or treatment with, antibiotics may upset the normal body bacterial flora. It permits resistant organism, previously harmless, to flourish and possibly acquire virulence. Normally innocent, molds have been reported to attack the mouth, rectum, vagina, and lungs. New infections frequently are more difficult to control than the infection which originally suggested use of antibiotics.

Canadian workers pointed out another public health aspect of penicillin in milk. Thatcher and Simon (*Can. Jour. Publ. Hlth.*, 46:407, 1956) examined 100 random samples of cheese and noted that 67% of the streptococci isolated and 15% of micrococci were resistant to penicillin and dihydrostreptomycin, antibiotics most frequently employed in mastitis therapy.

Promiscuous and ill considered use of antibiotics in treating mastitis, states F. J. Doan (*Jour. Dairy Sci.*, Dec. 1956), may be looked upon as a "serious threat to the dairy industry."

PRINCIPLES OF ANIMAL HEALTH

R. R. DYKSTRA, D.V.M.

Manhattan, Kansas

Optimum Age of Vaccination for Avian Bronchitis

Bronchitis vaccination in chicks is best not practiced till they are at least ten days of age. Frequently, before they reach this age, they acquire a natural infection, and this confers a much more solid immunity. When the disease makes its appearance in fowl of 14 weeks of age or older, advise vaccination.

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Hazard of Brucella Infection

In an address about "Trends in Brucellosis Control" given before the United States-Mexico Border Public Health Association, Dr. Karl F. Meyer stressed at least two important points that veterinarians should at all times impress upon their clients, *i.e.:*

1. The importance of pasteurization of milk derived from cows and/or goats, or a mixture of these milks. This practice destroys the brucellosis organism, and controls the principal source of infection of human beings.

2. Also, that reliance to prevent spread to human beings must not be centered alone on pasteurization. Other methods of spread, particularly those involving physical contact with infected cattle and swine, especially the handling of aborted feti, or treatment of genital ailments, et cetera, must be prevented by appropriate sanitary steps.

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In the summary of report of a research project entitled, The Fertility of Bovine Semen Collected by Electroejaculation appearing in *The Veterinary Record* for Dec. 15, 1956, by Manton it is stated that "no deleterious effect on fertility was found when using semen collected by this method."

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Psittacosis is readily diagnosed in the laboratory by inoculating seven-day-old chick embryos with some material obtained from the liver or spleen of suspected birds.

Intercommunicable Disease

"Louping Ill" an encephalomyelitis of sheep due to a virus transmitted by a tick occurring particularly in Scotland, though also observed in several other European countries, and transmissible to cattle and swine, as well as some laboratory animals (mice and monkeys), is now definitely regarded as one of the animal diseases to which human beings also are susceptible. Laboratory workers are most frequently involved, though its direct transmission between infected sheep and their attendants remains for conclusive establishment. In man the observed symptoms are headache, impaired vision, and elevated temperature. This transmissibility to man indicates that the number of intercommunicable diseases is a growing one. In this same connection, though no relationship to "louping ill," the transmission of the "common" cold material from man has been reproduced in suckling hampsters by nasal inoculation.

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Insulin Test for Dwarfism

Veterinarians and livestock interests continue to evince an interest in cattle dwarfism as evidenced by repeated inquiries about this anomaly. The so-called insulin test especially for the detection of carriers of the taint is most frequently the nature of the inquiry. To the best of our knowledge the published information about this test is still in the research stage though it has been indicated that an injection of insulin in clean animals results in a strong and rapid increase in the number of leukocytes in the blood stream. The reaction in "carrier" animals, that is those that are known to have produced a dwarf calf, was noticeably slower and much less pronounced in so far as the leukocytic count is concerned.

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Air-sac mite infestation in fowl seldom manifests itself by gasping as a clinical symptom. However when the infestation is heavy, gasping may be an accompanying evidence of the condition.

PUBLIC HEALTH

JAMES H. STEELE, D.V.M., M.P.H.
Atlanta, Georgia

Distribution of Toxoplasmosis

In a recent article by Feldman and Miller (*Am. Jour. Hyg.*, Nov. 1956) on the distribution of toxoplasma antibodies among ten man and 24 animal populations that were studied in widely separated areas, sera examined was received from Alaska, Iceland, Philippines, Haiti, Honduras, Tahiti, Arizona, Oregon, Missouri, Louisiana, Pennsylvania, and New York. The results for human tests are summarized in table 1. The experience with animal population varied considerably.

Among laboratory reared animals, rats were negative while 27% of guinea pigs and 5% of the rabbits were positive. Cattle groups varied from zero in closed herds to 38 and 48% among commercial herds in the vicinity of Ithaca, N. Y. Cattle examined belonging to Navajo Indians were negative. Four groups of dogs were studied with antibody variations from 28% among Syracuse strays, 30% in Navajo Indian dogs, 59% among north central Pennsylvania strays and 86% in Honduras

TABLE 1. Frequency of Toxoplasma Antibodies Among Ten "Normal" Human Populations

Population	Number Tested	Positive No.	Positive Percent
Eskimo	21	0	0
Navajo Indian	236	10	4
Iceland	108	12	11
Portland, Ore.	293	51	17
St. Louis, Mo.	184	47	26
New Orleans, La.	270	84	31
Pittsburgh, Pa.	144	51	35
Haiti	104	37	36
Honduras	266	170	64
Tahiti	121	82	68
Totals	1,747	544	31

dogs. Goats from New York were positive to the extent of 48% and 40% in two groups studied. Six percent of the horse serums from central New York were positive. Sheep sera from the Navajo country were positive in 5% samples tested while sera from Kentucky had 56% positive reactors. Swine tested for antibodies varied from 29% in Chicago packing houses to 43% in central New York. A small series of swine sera from Honduras had only 11% positive reactors. Of cats tested 31 and 34 percent of the sera from animals in Boston and Syracuse were positive.

The authors do not draw any conclusions as to the relation of human and animal infections. They emphasize the danger of generalizing from serological data obtained from two or three groups of animals to the species as a whole.

The epidemiology of toxoplasmosis has not been resolved, neither has the relation of animal and human infections. Veterinary physicians as well as veterinary research workers and public health health authorities should be cognizant to toxoplasmosis in their work. They all may have the opportunity to contribute to the knowledge of this challenging problem.

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Food Poisoning

The *Journal of the American Medical Association* for January 26, 1957, has called attention to Salmonella as a major cause of food poisoning in the United States. In this discussion it is stated that more than 5,000 persons were reported ill due to salmonellosis during 1955. The data available indicates that food-borne infections appear to be on the increase and that the cases that are reported are only a part of the problem. The editors urge that physicians report all food poisoning outbreaks to public health authorities for detailed investigation.

To resolve a food-borne infection episode it is important that certain steps be taken to prevent future incidents. To properly evaluate each outbreak it is important to know (1) the bacterial agent involved, (2) the vector or vehicle, (3) the reservoir and (4) the route of transmission. Naturally the beginning of any disease outbreak investigation in man is a report of the physician and likewise the same can be said for any epizootic. The veterinarian in the field is an important part of any epidemiological investigation.

POULTRY PRACTICE PROBLEMS

W. R. HINSHAW, D.V.M., Ph.D.

Frederick, Maryland

Non-Laying Hens

At the 29th annual Poultry Breeders School held at the University of Massachusetts on October 18-19, 1956, Dr. F. B. Hutt, Cornell University, discussed the problem of non-laying hens. He reported that in a four-year period the percentage of these birds in the Cornell flock averaged from 1.4 to 5.6%.

Two common causes of failure to lay were described by him. One type is the bird which ovulates fully matured yolks into the body cavity but the oviduct either fails to pick them up or because of an abnormality, passage becomes impossible. In these cases, normal yolk absorbs rapidly and fully matured yolks may be absorbed within 24 hours.

Such ovulating non-layers have all the appearances of normal laying hens. They make daily visits to nests, and have all the physical appearances of a normal laying hen. This type creates a severe problem, because such birds can not be normally identified unless the flock is trapnested or kept in cages.

A second type of non-layer described by Hutt also has all the appearances of a normal layer but has a retrogressive ovary. These birds have a large number of yolks present but with no progression in size. These yolks are not ovulated but atrophy and are resorbed. One cause of this condition is the use of lights to stimulate production at a too early age. Doctor Hutt's research in this field indicates that birds exposed to lights early in life become refractory to their stimulatory effect. This type is equally difficult to identify.

In addition to the two types described by Hutt, there are many other causes of non-layers in a flock. Included are numerous chronic diseases of the reproductive tract. Examples are ovarian tumors, pullorum disease, fowl typhoid, tuberculosis, and chonic respiratory infections. Worm infestations, chronic coccidiosis, external parasitic diseases and surviving carriers of many other diseases may increase the number of non-layers. Old age may be another factor. Such cases are however evident on casual inspection and can be readily culled.

Geographical Adaptation of Poultry

Dr. D. C. Warren, who recently retired as poultry geneticist in the U. S. Department of Agriculture, in a lecture given in Bombay, India in October 1955, discussed the problem of geographical adaption of poultry to different world-wide environments (*World's Poultry Science Journal*, 12:272, [Oct-Dec.] 1956). According to him there is little experimental evidence that poultry have any important geographical adaptations. Even in America there is a wide range of climatic conditions, and yet hatching eggs and day-old chicks are for example transported from New York to California and North Dakota to Louisiana with no apparent adaptation problem.

Warren's world-wide studies and observations on adaptation problems have convinced him that American and European stocks can adapt themselves readily to the climates of Egypt, Turkey, India, or other world areas. Regardless of origin, they seem to thrive if given favorable management. A local example quoted by him is the New Hampshire breed which was developed in New Hampshire has become the most popular breed in southern regions.

He believes however, that indigenous breeds of any country even though presently lacking in certain desirable characteristics should not be discarded because they must have acquired through evolution some genes which should be of value in improving the industry even in the most backward areas. The Fayoumi breed of Egypt was cited by him as an example. Under American management conditions, its body size and egg size are too small to meet requirements, but it does show high egg production, excellent shell thickness and high resistance to leukosis. In conclusion, Warren stated that the chicken is sufficiently adaptive to permit the use of concentration of desired genes found anywhere in the world.

▾ ▾ ▾

Egg production in United States in 1955 was 165,236,111 cases or a 1% increase over 1954.

THE PRACTITIONER'S LABORATORY

WILLIAM L. SIPPEL, B.S., V.M.D., M.S., Ph.D.
Kissimmee, Florida

Biological Test for Strychnine

As strychnine appears to be one of the favorite tools used by dog poisoners, veterinarians may desire to confirm a clinical impression of strychnine poisoning, or to establish a diagnosis in a dog that was dead when received for examination. The following test for strychnine and similar alkaloids (brucine, hydrastine, gelsemine) is a simple one easily performed in the office laboratory.

An equivalent amount of tenth normal (N/10) hydrochloric acid is mixed well with 10 to 25 gm. of stomach contents or used to wash off the suspected "bait" specimen. Approximately N/10 hydrochloric acid can be made by adding 8.5 ml. of concentrated (37%) hydrochloric acid to 991.5 ml. of water. This same solution is used as diluting fluid for total leucocyte counts or for hemoglobin determinations by the acid hematin method. The suspension is spun down in a centrifuge or allowed to settle.

Draw off 2 to 5 ml. of the supernatent fluid and inject into the dorsal lymph sac of a frog, (fig. 1), with a syringe and as small gauge needle as possible (27 gauge preferred). The dorsal lymph sac is easily identified as a "subcutaneous" space on the back. The skin is readily picked up over the rump with a pair of rat-toothed thumb forceps to make the injection. Should a sufficiently small bore needle not be available, the injection into the dorsal lymph sac can be made by inserting the needle up through the leg muscles, which will prevent leakage. It is well to hold the legs of the frog with a towel to prevent its slipping away.

The frog is observed, at room temperature, for the development of symptoms of strychnine poisoning, which will appear within 10 to 30 minutes. The characteristic, easily stimulated tonic spasms, with intermittent periods of relaxation, are well known to veterinarians. In the case of the strychnine injected frog, merely tapping the table stimulates the typical tetanic spasm. While in one of these spasms the front legs are flexed and the rear legs, neck, and back extended so that it is possible to hold the frog horizontal in space by the back legs.

Frogs or toads are found in season in most localities. Out of season they are available from biology departments at high schools or colleges or from many hospitals or private laboratories where they are used for human pregnancy tests.

Injection of frog. Note method of restraint and site of inoculation.

In order to prevent blockage of 27-gauge needles by dissolved salts, after-care should include washing with water and blowing out the water with a syringe.

The possibility always exists that the stomach may be too full for 25 gm. to provide sufficient strychnine to be toxic to a frog, or unfortunate sampling may miss the strychnine containing portions. Other sources of possible false negative results are advanced putrefaction of the material to be examined or possibly absorption and detoxification by the liver. Experience at the Georgia Coastal Plain Experiment Station, where the toxicologist checked the biological test with a chemical test, indicated that these factors apparently do not limit the usefulness of the test.

Cases of this nature tend to develop into neighborhood fights and lawsuits, neither of which can be regarded as practice builders, however, they are a part of general practice. Lawsuits can be discouraged if the impression is given that a costly chemical identification of the agent in the stomach contents by a chemical laboratory is necessary to positively identify the cause of the trouble. If the veterinarian bears in mind that he is testifying only as to symptoms produced and not chemical identity, he will be on solid ground and need not fear the expert witness role.

The grave danger of strychnine or other poison baits to small children should be emphasized as a deterrent to the vicious act of dog poisoning.

VETERINARY NUTRITION

MORRIS ERDHEIM, D.V.M.
Chicago, Illinois

Medication of Feeds

This subject of medicaments in feed is receiving greater attention today than ever before. Veterinary practitioners in predominantly hog areas are not being consulted as formerly in reference to medical management in cases of pig scours and "necro." The swine grower can now buy highly fortified pig feed containing antibiotics, arsenicals and other medicaments to treat a number of disease conditions. Diagnosis is strictly on a do-it-yourself basis.

The following figures were compiled by the research staff of *Feedstuffs*. Figures are based on official government data or are substantiated by industry estimates. They do not represent the total additives used in feeds, but do indicate the extent to which such additives are being used.

Sales Tonnage and Dollar Volume of Feed Additives

Drug Additive	Year	Sales (lb.) Quantity	($) Value
Arsenicals	1955	1,980,000	5,000,000.
Antioxidants	1956	2,500,000	3,100,000.
Antibiotics	1951	196,000	17,532,000.
	1952	172,000	16,962,000.
	1953	391,000	19,423,000.
	1954	562,000	25,900,000.
	1955	553,000	26,100,000.
Coccidiostats	1956	—	18,000,000.
Estrogenic hormones	1956	3,932,500 (gm.)	4,000,000.

The medicaments used are not all for "treatment" purposes. A substantial portion could be classified as "growth stimulants." This is particularly true of the arsenicals, antibiotics, and estrogens.

It is clear that the overall economic effect of adding medicaments to feeds has been to save production costs for the producer. This is made possible by growth-stimulating effect, as well as the antistress contribution of these additives.

There are two considerations for the veterinary practitioner in this picture: (1) His relationship to economic livestock production, and (2) treatment of disease to minimize losses.

It is becoming abundantly clear that the growing cost-price squeeze is forcing the livestock producer to improve his efficiency. This must then mean that more pounds of meat have to be produced per hundred pounds of feed consumed. The producer has been shown that medicinal feed additives can help accomplish this.

Where does the veterinarian fit in? In his presidential report to the convention of the Illinois State Veterinary Medical Association, held in February of this year, Dr. C. M. Rodgers pointed out that veterinarians will have to concern themselves with basic economics of livestock production. At this time the livestock owner is primarily interested in making a profit by improving production efficiency. Until now, the practitioner has assisted the grower by minimizing losses *after* disease struck. He has also helped in preventing disease by employment of biological products developed specifically for professional administration. The profession has been less directly concerned with more efficient production by improved feeding programs and technics, sounder management practices, et cetera. Veterinarians generally have been taking for granted that these areas would be taken care of automatically. This made it easier for non-veterinarians to step in with this guidance.

In the area of disease treatment, the practitioner must be concerned with the addition of medicaments to feeds for this purpose. While it may appear to be economically sound to treat scours with medicated feeds, doing so on a do-it-yourself diagnosis can not be a sound approach to the problem. Certainly, the services of the veterinarian must fit in here to supply the diagnosis and prescribe the specific treatment, either on a supply or perhaps prescription basis.

The problem is a complex one that has appeared suddenly. It would seem that if animal agriculture is to continue to be saved by the profession, some serious consideration will have to be given the matter by local practitioner as well as leaders at the organization levels. One thing is clearly demonstrated by the above data; trend towards medication is growing. It cannot, obviously, be wished away. Adaptation of practice technics to the situation as it exists must be made to assure profitable livestock operation, quantity and quality meat products, and the public health.

BOOK REVIEWS

Books reviewed in this department and any other books, if available, may be obtained by remitting the published price to the Book Department, Veterinary Medicine, Suite 803 Livestock Exchange Building, Kansas City 2, Missouri.

DISEASE OF CATTLE: A TEXT AND REFERENCE WORK, edited by *M. G. Fincher, W. J. Giggons, Karl Mayer,* and *S. E. Park,* representing works of 57 authors. American Veterinary Publications, Inc., Evanston, Ill., publishers.—Price $16. U.S.A., elsewhere $16.50.

Diseases of Cattle has been written by a large group of the best qualified persons available on a wide range of subjects concerned with diseases to which this class of livestock is subject. All are recognized authorities and some enjoy international reputations for their research and experience on the subjects on which they have written. Doctors Fincher and Gibbons of the editors, have also written selected chapters.

The first four chapters are devoted to general considerations, *i.e.,* Physical Examination, Laboratory Examination, Administration of Medicines, and Nutrition. These concern matters of interest to the clinician whenever a disease problem is presented, whether it be in a single individual or a herd or pasture of cattle.

Following one chapter (chap. 5) diseases are discussed by body systems; additional chapters are devoted to Artificial Insemination, Toxicology, Bacterial, Viral, and Protozoan Disease, and miscellaneous or unclassified anomalies.

That the editors performed successfully a remarkable task of coordination of text material is evident. Some duplication and variation in emphasis was inevitable considering that many writers expressed opinions as well as facts so that uniformity has suffered. Comprehensiveness and authenticity of the work more than compensate for unevenness evidenced by the work of many hands.

The book is well illustrated with an excellent selection of clear photoengravings.

Problems daily referred to practitioners are discussed here, bringing into focus modern technics of medical management of almost all the common disease of cattle known to exist in this country, plus some of the most dangerous exotic foreign diseases.

A PICTORIAL HISTORY OF MEDICINE, by *Otto L. Bettmann,* Ph.D., Founder and Director of the Bettmann Archive, New York City. Foreword by *Phillip S. Hench,* M.D. 318 pages, profusely illustrated. Charles C. Thomas, Springfield, Illinois, American publishers, 1956—Price: $9.50.

As suggested by the title, Dr. O. L. Bettmann's pictures bear the brunt of the presentation. He has chosen 1,000 of his most interesting and pertinent prints; illustrations collected from all over the world and from various times. All portray the physician and the sickly world he treats.

The book begins 50 centuries ago and brings the story up to the turn of the 20th century. The veterinarian will be impressed that his own art, science, and profession developed under the same stimuli as the human counterpart, suffered the same involution during certain eras, and generally progressed in tune with the times. He will see that his own problems are not unique, that medical problems are never new — they merely bear fresh labels.

The veterinarian will be surprised to learn that the Rx on his prescription blank descends from the myth of the Eye of Horus, that the art of the enema was learned from a bird, that the Babylonians believed insects to be carriers of disease, and made diagnoses from sheep livers. Chiron the Centaur, Aristotle the zoologist, Pasteur, Koch, Lister, Osler, Hopkins, Roentgen, Ehrlich, are all there. Pictured are the curing of prolapsed intestines by holding a dead dog against the affected parts, a deer shedding cherished bezoars, dogs nimbly vying for tasty tidbits on the dissecting-room floors, transfusion from dog to dog and lamb to man, how Stephen Hales first measured the blood pressure of a mare.

The result is a vivid volume that will allow the scholar to toss out at least three feet of medical-history from his shelves and replace them with this single book.—*Kenneth B. Hass, D.V.M.*

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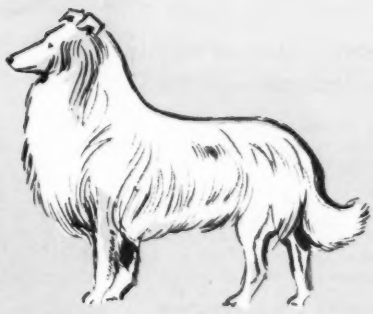

*Trade Name for Canine Distemper Vaccine and Infectious Canine Hepatitis Vaccine in Bronchisepticus-Streptococcus-Typhimurium Bacterin. (P.-M. Co., Bio. 667)

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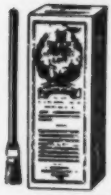

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A bill prohibiting purchase, use, or possession of unattenuated live hog cholera virus has been passed by both houses of the New Mexico legislature and is at present awaiting action by the governor.

▼ ▼ ▼

Approximately 94% of clinical cases of mastitis are resolved on antibiotic treatment.—*J. L. McAuliff, D.V.M.*

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Research Reveals Highly Effective Anthelmintic for Cattle

The results of recently intensive clinical research revealed an anthelmintic that is highly effective in cattle. Individual animals were confined in special stalls and administered different phenothiazine drench formulations for testing. All urinary and fecal excreta were recovered and each excretion was individually analyzed chemically to determine how much of the dose went into the digestive tract and amount of the dose available for killing worms. Dosages were given on an identical basis.

GREATER CONCENTRATION

Results obtained from this modified formulation were better than that of unmodified drenches generally used. Tests show that modified formulations produced on the average 6 to 8 times more phenothiazine in the digestive tract in a shorter period of time than other drenches. For example, peak percentages (above 1%) of the modified chemical were obtained in only 17 hours post treatment while the average of unmodified formulations returned a peak percentage of less than .2% 40 hours or later post treatment.

All statements regarding the effectiveness of the above tests are backed by documented experimental data.

Many veterinarians are using this modified formula under the professional label Pro-Brand Improved Cattle Wormer which is sold only to veterinarians. A brochure is available on request. For details write to Pro-Brand Products Company, P. O. Box 4186, Fort Worth, Texas.

Illinois Veterinarians Meet in Chicago

Perhaps the decision to meet annually in Chicago has assisted in the growth and enthusiastic participation of members of the Illinois Veterinary Medical Association. In any event, total registration for the 75th annual meeting on Feb. 25-27, 1957 was 806, which included 150 wives of visitors.

Dr. John B. Jaffray, CVC '03, Chicago, is presented a 50-Year-Pin by Dr. A. E. Bott, Belleville, chairman of the Executive Board of the Illinois State Veterinary Medical Association. The presentation was made at the 75th annual meeting of the Illinois State Veterinary Medical Association held Feb. 25-27 at the La Salle Hotel, Chicago.

Sixteen veterinarians received pins in recognition of 50 years service to the veterinary profession.

Sectionalization of this meeting too has become necessary during recent years and now three sections, General Practice, Small Animal Practice, and Sanitary Science meet simultaneously during portions of the three day meeting.

Featured at the banquet were ceremonies honoring 16 association members for 50 years of service to the profession. Six of this group were in attendence among them Dr. John B. Jaffray, Chicago, who was also honored as Illinois Veterinarian of the Year (see photo above).

▼ ▼ ▼

Calorie deficiency, rather than a lack of vitamin or trace mineral factors, is the commonest nutritional cause of low production rates in animal husbandry.

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Antibiotics appear to have their greatest growth effect on animals suffering low-grade infections.

nonspecific dermatoses?

demodectic mange?

BEFORE SELEEN—Hound had suffered from demodectic mange almost from birth. In spite of therapy with almost every type of skin medicament, condition grew steadily worse. Photo taken four days before first SELEEN treatment.

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These dermatological and ectoparasitic conditions can be extremely troublesome—to patient, client and veterinarian. Today, such conditions are most effectively, most conveniently controlled in dogs *and* cats with

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- *complete control* in 87% of nonspecific dermatoses . . . definite improvement in another 11%.
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- *thorough cleansing* of skin and haircoat . . . removal of tissue debris.

Like a shampoo, SELEEN lathers fast, rinses easily, has a pleasant odor and leaves no stains for carpets or furniture.

SELEEN Suspension, sold to veterinarians only, is supplied in 6-fl. oz., pint and economical gallon bottles. Order from Abbott Laboratories, North Chicago, Ill.; your nearest Abbott branch, or your distributor.

Abbott

Classified Advertisements

Twenty-five words or less, $3.50—minimum charge; additional words, 10 cents each. Replies sent care VETERINARY MEDICINE. 50 cents additional to cover forwarding postage. Remittance must accompany order.

Names of classified advertisers using V. M. key numbers cannot be supplied. Address your inquiry to key number, care VETERINARY MEDICINE, Suite 803, Livestock Exchange Building, Kansas City 2, Missouri, and it will be promptly forwarded to the advertiser.

To assure inclusion, copy must be supplied by the 5th of the month preceding date of issue (January 5 for February issue: February 5 for March issue, etc.).

WANTED: Sales representative to call on veterinarians. Nationally known inhalation therapy equipment for large and small animals. Exclusive territory and top commissions. State experience. Address Box 353, care VETERINARY MEDICINE.

VETERINARIAN WANTED: Veterinarian for staff of large hospital for small animals in New York City. Opportunity. Address Box 354, care VETERINARY MEDICINE.

BOARDING KENNEL: Located south of, and near Boston. Large old home and newly constructed kennel. Eight acres business zoned. Excellent main road location for veterinarian. Address box 355, care VETERINARY MEDICINE.

WANTED: Veterinarian with some experience in small animal hospital is wanted in a small animal hospital in Chicago. State age, married or single, and salary expected in first letter. Address Box 356, care VETERINARY MEDICINE.

SALESMAN WANTED: Recognized distributor of nationally known veterinary products (antibiotics, pharmaceuticals, surgicals, etc.) offers exceptional opportunity to experienced salesmen now calling on veterinarians. Top commissions, protected territories. No objection to other lines. Write full details in confidence. Address Box 357, care VETERINARY MEDICINE.

EQUIPMENT WANTED: Opening a new animal hospital. Interested in good used equipment either by piece or units. Address Box 358, care VETERINARY MEDICINE.

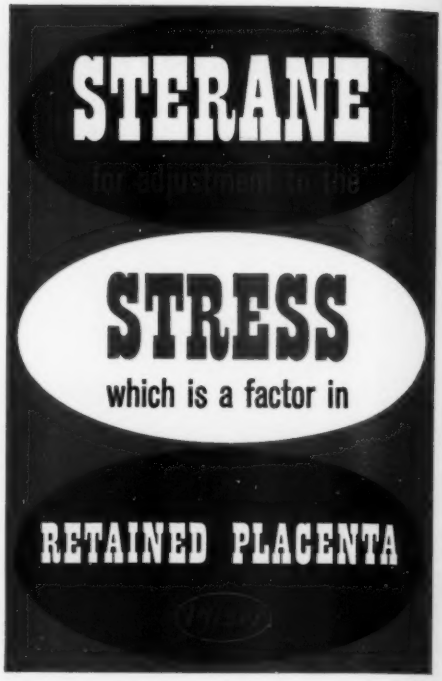
GET FULL LINEUP: On kennel blanks, forms, contracts, and certificates by sending $1. for Kennel Blanks Sample Kit. Subscribe to Dog World—$5. two yrs. Judy Publ'g Co., 3323 Michigan Blvd., Chicago 16.

FOR SALE: X-ray portable—new tube, 15-75. Includes cassettes, new tank, film holders. Price $375. Dr. R. Stone, 20198 Livernois, Detroit 21, Mich.

WANTED: To purchase or lease well established small animal hospital with living quarters. Missouri, Illinois, Indiana. Willing to work for owner one or two years prior to purchasing or leasing. All replies acknowledged and held confidential. Address Box 359, care VETERINARY MEDICINE.

WANTED: Established small animal practice with good growth potential. Will consider anywhere. Licensed Michigan, Indiana, Kansas, Arizona and California. Presently in Service. Substantial down payment. Address Box 351, care VETERINARY MEDICINE.

Poor management, malnutrition, and parasitism stand foremost as contributing factors, either directly or indirectly, to a major portion of the maladies affecting dogs. — *Frank A. Hayes, D.V.M.*



VETERINARIANS

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Animal Disease and Human Health Conference Postponed

The Conference on Animal Disease and Human Health, a scientific assembly to be sponsored by the New York Academy of Sciences and the Communicable Disease Center of the Public Health Service, May 2, 3, and 4, 1957, has been postponed until Sept. 11-13, 1957, dates to be confirmed.

Those planning to attend are advised to watch for additional notices of this conference in professional journals where confirmation of final dates will be announced.

For further information address: Dr. James Lieberman, acting chief, Health Services Training Section, Training Branch, C.D.C., P.H.S., D.H.E.W., 50 Seventh St., N.E., Atlanta 23, Ga.

Doctor Sauter Joins Corn States

Corn States Laboratories, Inc., announces the appointment of Dr. Robert A. Sauter, as Head of Research, Development, and Clinical Evaluation.

Dr. Robert A. Sauter

Doctor Sauter, Cornell '47, left private practice in Albany, N. Y., to join the Corn States Research Staff, bringing a wide variety of clinical, research, and practical experience to his new position. He is a former staff member of Ellin Prince Speyer Hospital for Animals and of the A.S.P.C.A. Hospital, both of New York City. He served four years in the Army Veterinary Corps, is a member of the A.V.M.A., and Omega Tau Sigma.

Doctor Sauter's appointment is part of the program of expanded production evident at Corn States. It is expected that his activities well serve to increase the number of top-quality products available exclusively to the veterinary profession.

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Of the avitaminosis, avitaminosis A is most likely among livestock under modern management.—*G. K. L. Underbjerg, D.V.M.*

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Experience of those working with the New York Mastitis Control Program indicates that four of five milking machines in use in New York herds need adjustment or repair. Unless operated properly and kept in repair, machines have dangerous injury potential.—*John L. McAuliff, D.V.M.*

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Dr. Gail E. Hawley, Pfizer Research Veterinarian, Dies of Plane Crash Injuries

Dr. Gail E. Hawley, M.S.U. '50, research veterinarian on the staff of Chas. Pfizer & Co.'s Agricultural Research Center, died Saturday, Mar. 16, from injuries suffered Mar. 6 in the crash of a chartered plane near Grant Park, Ill. Death came in St. James Hospital, Chicago Heights, where Hawley had remained in critical condition since being taken there following the accident.

Dr. Gail E. Hawley

Hawley was one of the original team of nutritionists and veterinarians employed by the Pfizer company to establish its Agricultural Research Center at Terre Haute, Ind. Prior to joining Pfizer, in May of 1952, he had been in private practice in Glendive, Mont., and his basic and continued interest in problems of the large animal industry was carried over into his research efforts. A recognized specialist in the diseases and nutrition of large animals, Hawley made major distinctive contributions to industry-wide efforts to find improved means of combatting mastitis, to control and treatment of such feedlot diseases as shipping fever and rhinotracheitis, to improved methods of creep feeding younger animals, and to general commercial feedlot nutrition practices. He was the author of numerous scientific and popular articles dealing with these and other veterinary-related fields and held a number of patents.

In addition to his agricultural research interests, Doctor Hawley exhibited an unusual aptitude for design and manufacture of special surgical and orthopedic devices, a number of which are presently in broad use in the medical field.

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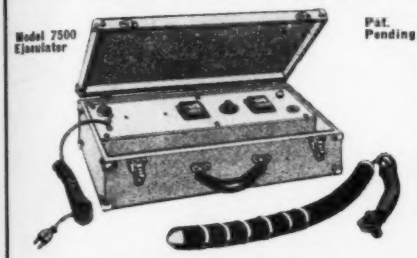

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- **FERTILITY TESTS MADE FAST—SIMPLE**

  Range animals need not be trained—save expense of keeping sterile animals—test before purchasing.

PROBES TO FIT ALL ANIMALS

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4605 Lyndale No. Minneapolis 12, Minnesota

New Crematory Furnace

The Syrall Manufacturing Company has announced the development and availability of a new crematory type gas-fired furnace designed with the veterinary practitioner in mind.

Disposal of wastes, including soiled cage papers, contents of clinical waste receptacles, et cetera, has posed problems not only of disposal alone but of disagreeable odors from inefficient trash burners. The important feature of the new equipment for veterinarians is that the furnace is a packaged unit, compact, and portable. Installation presents no problem, and the unit may be moved in the event of expansion of facilities or for any other reason. Great heat and firepower for rapid, odor- and smoke-free cremation are built in for the rapid incineration of wet or dry combustible material. Cremation of animal carcasses may be accomplished ethically and remains recovered. Capacity is measured as eight bushels. Weight is approximately 1,000 lb. with 150,000 b.t.u. imput. Size of charge door is ample (21″ wide x 19″ high) when top and feed door are opened (see illustration) which will handle rather large boxes or cartons and avoid spillage when dumping large containers. Equipment includes automatic timer, pilot burner, and safety valves.

For detailed information regarding the furnace (trademark Samco) and price, address Syrall Manufacturing Co., 511 North State St., Syracuse 3, N. Y.

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With VET-KEM in your hospital you'll be out in front scientifically . . . equipped to whip the resistant insect problem.

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GRUB-KIL
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KEM-DUST
Kills Fleas, Lice, Etc.

KEM-DUST

Highly effective for cats and dogs. Kills resistant and non-resistant fleas and ticks . . . checks fungi infections, dermatitis, skin diseases.

•

All VET-KEM products are packaged with TEAR-OFF LABELS.

SOLD ONLY TO GRADUATE VETERINARIANS THROUGH ESTABLISHED ETHICAL DISTRIBUTORS.

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FT. DODGE LABS.
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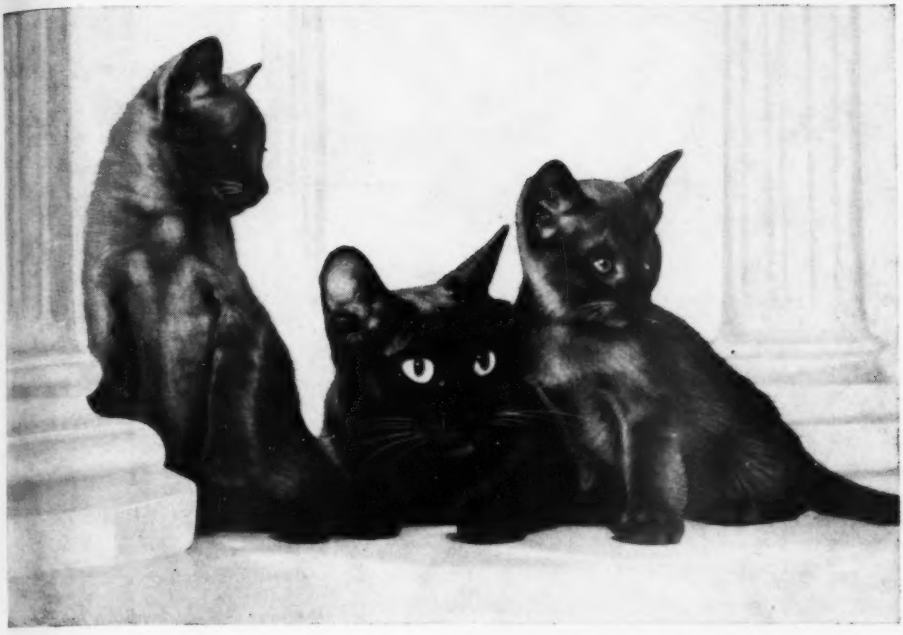


"Big... Beautiful ...always ready to play!"

The above quote from a letter sums up a typical layman's reaction to the dramatic results of good cat nutrition. Many such spontaneous expressions come in to us in letters written by cat owners . . . all describing the striking improvement that regular feeding of Puss 'n Boots has made in their pets.

Ideal Nutritional Balance

To the professional eye, of course, such expressions merely confirm the known fact that good nutrition brings quickly perceptible results. And Puss 'n Boots *is* good nutrition . . . scientifically formulated to provide every nutrient a cat is known to need. The formula includes:

• **Whole Fish** (not mere "fish frames" or scraps). The costly fillets are retained for their high-quality proteins . . . the liver and glands for their rich supply of vitamins and minerals . . . even the bone structure, made soft and digestible, for its valuable calcium and phosphorus.

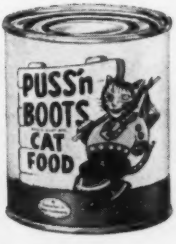
• **Selected Cereals** are added to the finely ground *whole fish* to provide necessary carbohydrates and roughage for all-round nutrition.

• **Extra Vitamin B_1** is added to every can for the benefit of cats requiring thiamine supplementation and as a "margin of safety" for all cats.

Recommend with Confidence

You can recommend Puss 'n Boots to your cat-owning clientele with complete confidence in its nutritional excellence. This superbly balanced cat food is available in two sizes at food and pet stores everywhere.

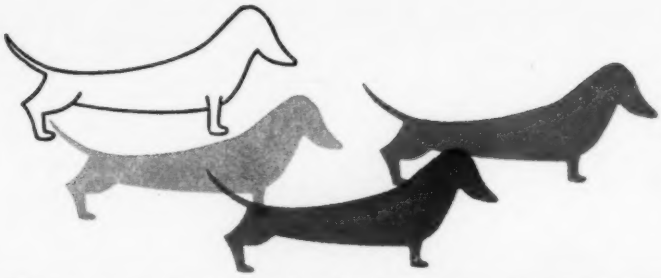
PUSS 'n BOOTS



is Good Nutrition

America's largest selling cat food... adds the plus in health, beauty, vigor

Coast Fisheries Div. of The Quaker Oats Co., Chicago 54, Ill.



thousands of clinical cases prove that...

KOAGAMIN®

parenteral hemostat

arrests bleeding in minutes
prevents excessive blood loss

A Few Cases From The Literature[1]

CASE	DOSAGE OF KOAGAMIN	RESPONSE
Fox Terrier mammary tumor	1 cc. I.M., ½ hour preoperatively	"...capillary hemorrhage decreased to negligible...."
English Thoroughbred excise lachrymal duct	20 cc. I.V., at close of surgery	"...in 10 minutes bleeding had come to a practical stop...."
German Shepherd penal sarcoma	hemorrhage 5 hours postoperatively—3 cc. I.V.	"Bleeding lessened in 10 minutes...ceased in 20 minutes."
*Thoroughbred Gelding** amputate scirrhous cord	bleeding despite ligatures—10 cc. I.V., 10 cc. I.M.	"Seeping hemorrhage was arrested in 10 to 15 minutes."
Terrier panhysterectomy	Profuse bleeding during surgery—2 cc. I.M.; 2 cc. I.V., 10 minutes later	"...marked reduction in hemorrhage within 4 minutes... hemostasis in 10 minutes."

*N.B. A second thoroughbred under identical conditions but without KOAGAMIN: postoperative seeping hemorrhage—½ hour; oozing—an additional 2 hours.

KOAGAMIN, an aqueous solution of oxalic and malonic acids for parenteral use, is supplied in 20-cc. diaphragm-stoppered vials.

1. Rachman, M., and Frucht, T. R.: Vet. Med. *49*:341, 1954.

Chatham

CHATHAM PHARMACEUTICALS, INC · NEWARK 2, NEW JERSEY

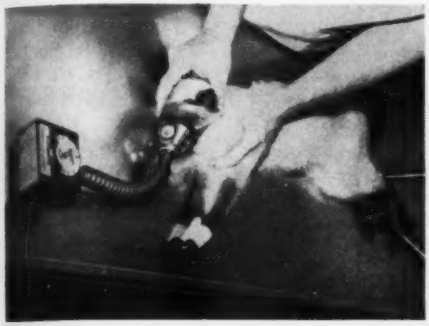
Distributed in Canada by Austin Laboratories, Limited, Guelph, Ontario

07655

Trimar Inhaler for Cats

For nearly half a century, Ohio Chemical anesthetics and apparatus have been standard equipment in hospital operating rooms.

After extensive research and clinical testing, Ohio Chemical* is entering the veterinary field with the introduction of the trimar® inhaler for anesthetizing cats.



The inhaler features an ingenious air mixer that offers controlled anesthesia and assures complete and deep relaxation. The apparatus fits snugly over the face (see accompanying illustration) and induction of anesthesia is rapid. Recovery is short and uncomplicated.

The improved design of the inhaler permits easy cleaning, minimal maintenance and low-cost operation.

▼ ▼ ▼

Federal Livestock and Poultry Disease Laboratory

A tract of land near Ames, Iowa has been selected and construction will soon be underway on the new $16,000,000. Federal Livestock and Poultry Disease Laboratory.

Primary object of establishment is research into a number of infectious diseases of all domestic livestock. The laboratory will also provide facilities for regulatory personnel who will be charged with assuring purity and other provisions of the Federal Pure Food, Drug and Cosmetic Act.

▼ ▼ ▼

American consumers reportedly spent $40.20 per person for pork products in 1949, but only $30.55 in 1955. These figures indicate that an even less proportionate quantity of pork was purchased because of higher unit cost.

*For detail information write the Ohio Chemical and Surgical Equipment Co., Madison 10, Wisc., and request bulletin no. 4731.

TOHOL for Bloat

A different approach to the reduction of foam in Frothy Bloat

Adult cattle — 6 ounces TOHOL, as is or diluted with water or oil, via dose syringe or stomach tube, or inject directly into dorsal vault of rumen with large gauge hypodermic needle. Calves and sheep — 3 ounces.

In vitro tests show TOHOL to be a more effective foam reducer than silicones.

Mixture of high molecular weight aliphatic alcohols (chiefly n-decanol and stearyl alcohol) in special solvent, methyl salicylate, cresylic acid, isopropyl alcohol.

12 ounce bottle.....0.85 doz. 12 oz.....9.00
gallon can 7.50

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Pharmaceutical Manufacturers to the Veterinary Profession - Since 1918
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You'll do better with Oster® the Veterinarian's Clipper

Customers like their pets to be clipped and groomed with the Oster. It's smoother, quieter . . . keeps animals relaxed and easy to handle. With six different blades for every type of clipping and surgical shaving.

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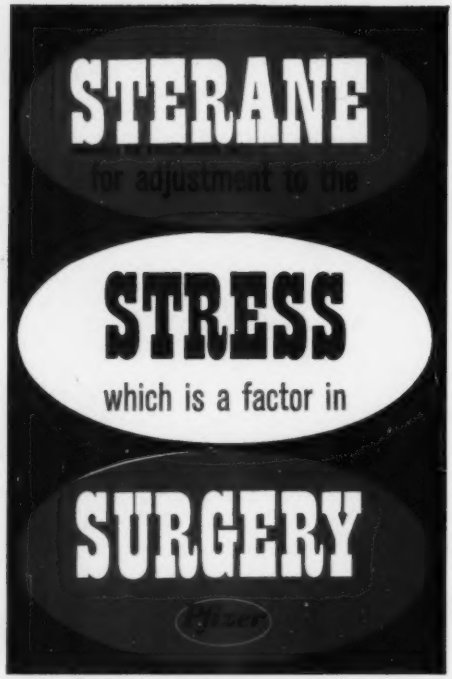
Dept. G, 3025 N. Lydell Avenue
Milwaukee 17, Wisconsin, U.S.A.



Southern Veterinary Medical Association
Roanoke, Virginia
October 27-30, 1957

Chairman for the various committees and delineation of duties are announced by Secretary Dr. A. A. Husman for the annual meeting of the Southern Veterinary Medical Association. Meeting of this group was postponed last year because of conflict with the late A.V.M.A. convention so that plans are being made to entertain a large crowd at Roanoke, Va. in October.

Pre- and postconvention tours for the Jamestown celebration (350th Anniversary of Founding) may be arranged easily from Roanoke and elaborate arrangement to commemorate the founding of the Virginia Colony will attract many visitors all season.

Dr. W. O. Crutchfield, Roanoke, Va., is chairman in charge of registration and Dr. I. D. Wilson, Blacksburg, is Program Committee chairman.

▼ ▼ ▼

Keep Teat OPEN — Keep It MILKING

To maintain unrestricted milk flow and provide antiseptic protection is of first importance in the care of Injured teats, Scab teats, Stenosis, and in post operative therapy. Dr. Naylor Medicated Teat Dilators are SULFA-impregnated surgical dressings for the teat canal.

They act both medically and mechanically to provide prolonged broad spectrum germicidal activity and gentle non-irritating support to traumatized sphincter and teat mucosa. They promote normal tissue repair with a minimum of altered milking function of the streak canal. Positive retention — fit large or small teats.

WITH ANTIBIOTICS

The soft, highly absorbent properties of Dr. Naylor Dilators make them an ideal vehicle for additional local medication of your choice. To obtain the synergistic bactericidal action of Antibiotics and Sulfathiazole following teat surgery, saturate with your favorite udder infusion antibiotic.

Dr. Naylor's
MEDICATED TEAT DILATORS

Have you used BLU-KOTE for Cowpox*, Ringworm, Moist Lesions, Skin Abrasions? Blu-Kote dries oozing lesions, reduces pus formation, controls secondary infection* . . . Quick Drying . . .

BLU-KOTE contains Acriflavine and Gentian Violet in combination with fungicidal Sodium Propionate and cleansing, debriding Urea. Effective against both bacterial and fungus infections most common in skin lesions of large and small animals.

4 oz. bottle (dispensing label) Per Doz. $8.00.

H. W. NAYLOR CO., MORRIS, NEW YORK

c

hog cholera

e

erysipelas

r

R_L products are sold only to Graduate Veterinarians

R_L Hog Cholera Vaccine A modified live-virus, vacuum dried, porcine origin. When used with serum, confers early, safe immunity.

Erysin Concentrated, formalin inactivated aluminum hydroxide, absorbed Erysipelothrix Rhusiopathiae organisms and their soluble antigens. These organisms have been specially selected and tested for their antigenicity.

These two products offer safety, efficiency and reliability in the prevention of Hog Cholera and Swine Erysipelas.

Research Laboratories, Inc.

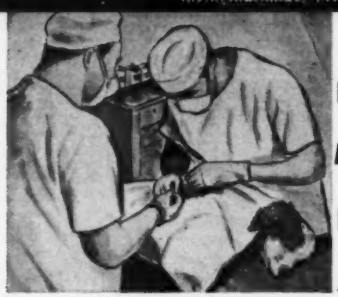
Saint Joseph, Missouri

Announcing

MIKEDIMIDE*

Methetharimide, PARLAM TRADEMARK

THE NEW BARBITURATE ANTAGONIST...



FOR BETTER MANAGEMENT OF BARBITURATE ANESTHESIA

There has long been a need for a highly selective, effective and prompt acting barbiturate antagonist which could be used safely and routinely, particularly in emergency states, to reverse the barbiturate action. Such a need is now fulfilled by *Mikedimide*, a clinically proven new drug which exerts its antagonism on almost all types of barbiturates.

Mikedimide acts promptly to increase respiration, restore reflexes and shorten sleeping time. *Mikedimide* has a high therapeutic index, and no signs of toxicity have been observed. Animals can be put to sleep or awakened almost at will, by the alternate use of barbiturate and *Mikedimide* without any apparent harm to the animal.

We present below abstracts of a few typical case reports pertaining to the use of *Mikedimide*:

Morphine sulfate (0.5 gr.) was administered subcutaneously and 3 cc. (180 mg.) of pento barbital sodium was given intravenously to a deep surgical plane. The subject suddenly ceased breathing. The heart was weak and reflexes were absent. Two and one-half minutes after respiratory arrest, 105 mg. of *Mikedimide* was given slowly intravenously. The amplitude of respiratory movements markedly increased. Reflexes returned within one and one-half minutes. The operation and recovery were uneventful. The sleeping time was shortened about two hours.

The patient was in shock and appeared to be a poor surgical risk. A single injection (45 mg.) of pentothal sodium was administered intravenously. Respiration ceased before the injection was completed. The heart was weak and all reflexes were absent. Within 30 seconds after respiratory arrest, 1 cc. (30 mg.) of *Mikedimide* was given intravenously. Respiration was resumed within 15 seconds. The heart became strong and the palpebral reflex returned in one and one-half minutes. Recovery was uneventful.

The patient was anesthetized with surital sodium (480 mg.), given intravenously. Reflexes were absent, respiration was slightly depressed and the heart was strong. Six minutes after anesthesia, *Mikedimide* (120 mg.) was injected slowly intravenously. There was an immediate respiratory response. The palpebral reflex returned at once. At the end of the *Mikedimide* injection, the dog tried to lift his head and sniffed the operating table. Fourteen minutes after the *Mikedimide* injection, the dog was almost conscious. The sleeping time was shortened by 50 percent and recovery was uneventful.

MIKEDIMIDE *is indicated for*

1. Emergency treatment for barbiturate overdose and respiratory depression.
2. Routine antagonism therapy against barbiturate anesthesia.
3. Respiratory stimulant in the presence of barbiturates.
4. Shortening sleeping time under anesthesia.
5. Respiratory and circulatory supportive drug in the presence of barbiturates.
6. Ambulating an animal shortly after surgery.
7. Achieving a "safe plane" of anesthesia during and after prolonged surgery.

Your request for Technical Data, and a clinical supply of *Mikedimide* will be given prompt attention. *At Your Supplier, or Write*

*Patent applied for.

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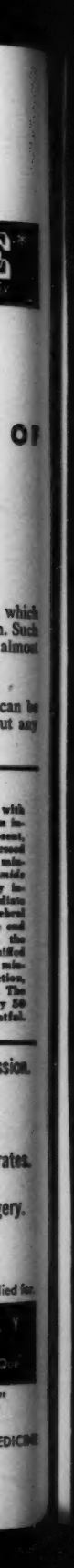
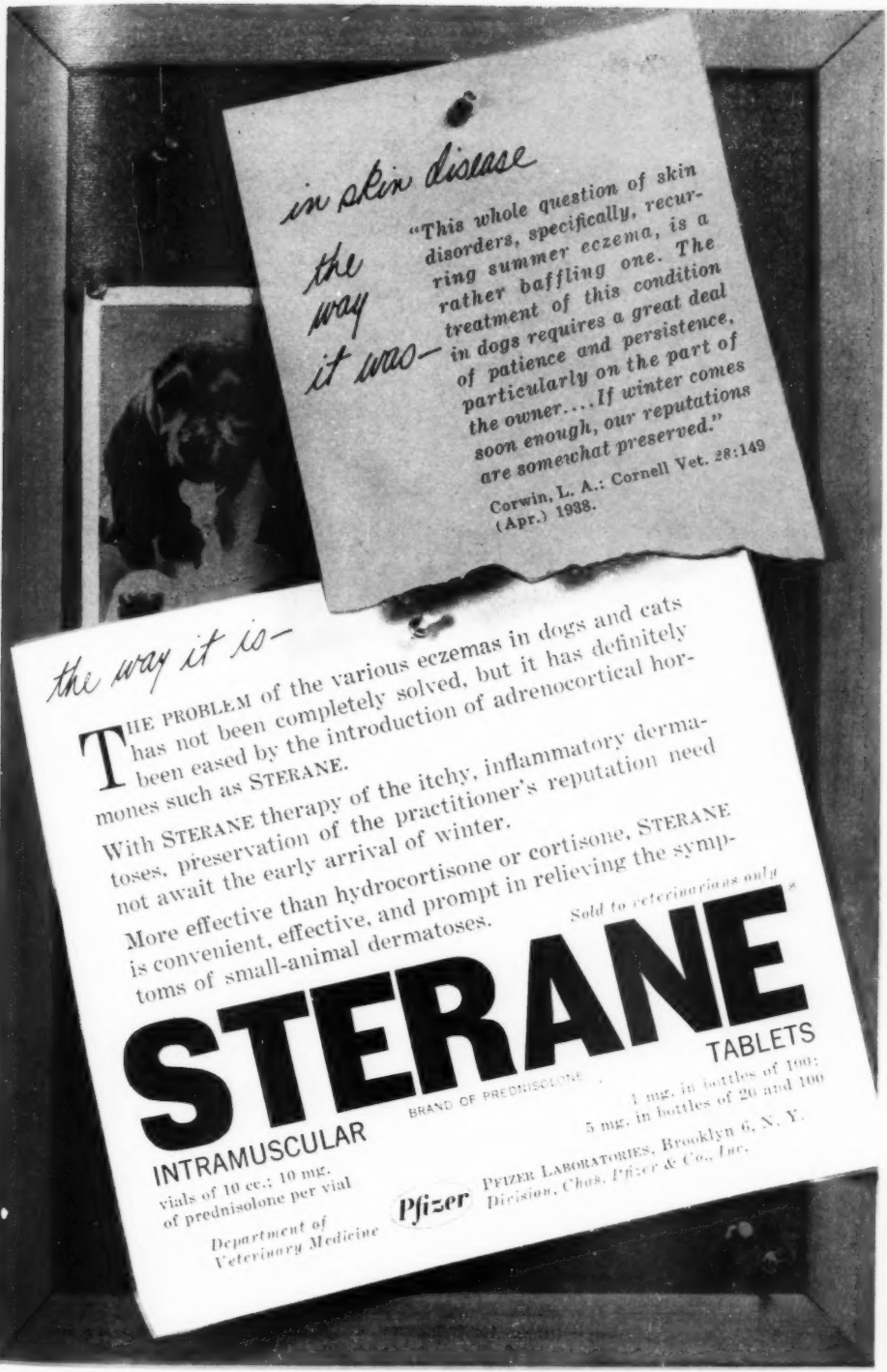
"Devoted to progressive veterinary research for the development of superior products for graduate veterinarians."




in skin disease
the way it was—
"This whole question of skin disorders, specifically, recurring summer eczema, is a rather baffling one. The treatment of this condition in dogs requires a great deal of patience and persistence, particularly on the part of the owner.... If winter comes soon enough, our reputations are somewhat preserved."
Corwin, L. A.: Cornell Vet. 28:149 (Apr.) 1938.
the way it is—
THE PROBLEM of the various eczemas in dogs and cats has not been completely solved, but it has definitely been eased by the introduction of adrenocortical hormones such as STERANE.
With STERANE therapy of the itchy, inflammatory dermatoses, preservation of the practitioner's reputation need not await the early arrival of winter.
More effective than hydrocortisone or cortisone, STERANE is convenient, effective, and prompt in relieving the symptoms of small-animal dermatoses.
Sold to veterinarians only
STERANE
BRAND OF PREDNISOLONE
TABLETS
1 mg. in bottles of 100;
5 mg. in bottles of 20 and 100
INTRAMUSCULAR
vials of 10 cc.; 10 mg. of prednisolone per vial
Department of Veterinary Medicine
Pfizer
PFIZER LABORATORIES, Brooklyn 6, N. Y.
Division, Chas. Pfizer & Co., Inc.

Before Paxital, requires special physical restraint

30 minutes after Paxital (subcutaneously or intramuscularly)

NEW nonsedative animal tranquilizer

Exclusively for veterinary use Paxital, a new animal tranquilizer designed exclusively for veterinary use, produces a peaceful mental state *without sedation.* Animals remain normally responsive to surroundings. Paxital controls anxiety, nervousness and apprehension. It also appears to have a significant analgesic effect.

Broad clinical application Paxital is useful to eliminate barking and relieve nervousness or tension, especially in hospitalized animals. It is of value to reduce biting and scratching in skin conditions . . . for minor surgery when a general anesthetic is contraindicated or undesirable . . . as an adjunct in major surgery to permit smoother induction of anesthesia and an uneventful recovery (and to reduce the amount of barbiturates necessary) . . . to counteract shock and as an antiemetic.

Dosage: Average dose (for 20 to 30 lb. dog): *orally*—50 to 100 mg. two or three times daily, as indicated; *parenterally*—2 cc. (50 mg.). Paxital may be administered intravenously, intramuscularly or subcutaneously. Occasionally, an additional 2 cc. may be required to obtain the desired clinical response. Tranquilization is obtained usually within 45 minutes following oral administration. Onset of action following parenteral administration is more rapid.

Contraindications: Hepatic diseases or disorders. Central nervous system involvement.

Packaging: 25 and 50 mg. tablets in bottles of 100 and 500; 2 cc. ampuls (25 mg./cc.) in boxes of 10 and 50.

Available through your ethical veterinary distributor.

Paxital*

BRAND OF MEPAZINE

*TRADEMARK

Division of Veterinary Medicine **WARNER-CHILCOTT**

IN MASTITIS

CHECK inflammation promptly

ERADICATE infection

REDUCE secretory tissue damage

METIBIOTIC

mastitis infusion VETERINARY

bridge the therapeutic gap in mastitis by reducing inflammation

In METIBIOTIC the more potent antiinflammatory properties of METICORTEN complement the wide antibacterial spectrum of **penicillin-dihydrostreptomycin,** which are bactericidal to the majority of mastitis organisms.

This combined action results in prompt penetration of the clogged ducts and high, sustained antibiotic levels. Recovery is rapid, usually following a single infusion, and milk production returns to normal generally within 24 to 36 hours.

packaging:

METIBIOTIC Mastitis Infusion Veterinary, 7.5 cc. tube, boxes of 12, 72, 144.

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METICORTEN,® brand of prednisone.
METIBIOTIC,* brand of procaine penicillin-dihydrostreptomycin in oil with prednisone acetate.

*T.M. V-MB-J-117

new specific treatment for calf scours

Developed specifically for the control of calf scours, new ENTEFUR provides rapid, effective and safe treatment. ENTEFUR drastically cuts mortality.[1,2] In one study, 60 of 63 ENTEFUR-treated calves survived, whereas in the control group only 3 of 24 calves lived.[2] "ENTEFUR treatment appeared the only factor modifying significantly the course and outcome of the disease."[2]

ENTEFUR contains the new nitrofuran, Furamazone* (brand of nifuraldezone) for rapid wide-spectrum bactericidal action against gram-positive and gram-negative enteric bacteria. ENTEFUR also contains bismuth subsalicylate for its mildly astringent, antidiarrheal action.

ENTEFUR BOLUS VETERINARY, small, contains: Furamazone 1 Gm., bismuth subsalicylate 0.26 Gm. Dosage: 1 bolus twice a day for 2 days. Supplied: Box of 24 (6 envelopes of 4 boluses each).

REFERENCES: 1. Bull, W. S.: N. Amer. Vet., In press. 2. Henry, R. T., and Blackburn, E. G.: Vet. Med., In press.

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NOW AVAILABLE THROUGH YOUR PROFESSIONAL VETERINARY DISTRIBUTOR

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Norden Laboratories Expands Technical Staff

Two appointments to the Technical division are announced by Norden Laboratories.

Dr. A. L. Brown, formerly assistant director of biological production, Sharp and Dohme, has been added to the biological research and production staff. Doctor Brown received his B.Sc., M.Sc., and Ph.D. degrees from Cornell University and is author or co-author of a number of scientific articles.

Dr. F. Scott Bukey, formerly pharmaceutical director of Smith-Dorsey, Lincoln, Nebr., division of the Wander Company, has been added to the pharmaceutical research and control staff. Doctor Bukey received his B.Sc., and M.Sc., degrees in pharmacy from the University of Nebraska and his Ph.D. degree in pharmaceutical chemistry from Purdue University. His extensive background includes teaching courses at Western Reserve University, Cleveland, Ohio, and the University of Nebraska.

▼ ▼ ▼

A recent study revealed that mow-cured hay retained 64% more of the carotene of the green crop than sun-cured hay.

MASON'S New KENNEL RUNS
NOW AVAILABLE
For SMALL ANIMAL HOSPITALS
Quickly Erected - NO POSTS REQUIRED
Can be set on concrete or wood floors or directly upon the ground, joining to, or independent of Building. Composed of strong, self-supporting Fence sections and Gate Units with GATES BUILT-IN and Lockable Latches.
FREE CATALOG
Send for Free Catalog with Low Direct Factory Prices of Kennel Fences of all kinds, Kennel Doors, Cages and Hospital Equipment.
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Early embryonal death and not failure of conception may be the reason for experience in some cattle herds having a high incidence of "repeat breeders." These occur in herds served either by artificial or natural breeding methods.—*F. H. Oberst, D.V.M.*

Safe-Dependable-Finest Quality

DIRO PET PRODUCTS

Formulated especially for use and sale by Graduate Veterinarians. Made under the careful supervision of a pharmaceutical chemist to assure highest ethical standards.

FLEA & TICK BOMB—For dogs. Effective against insects resistant to Lindane, DDT, other chlorinated insecticides.

FLEA & TICK POWDER—For cats and dogs. Anti-static. Penetrates coat; allows powder to reach skin. Effective against insects resistant to Lindane, DDT, etc.

FLEA & TICK DIP—For dogs. Modified dip and shampoo. Effective against insects resistant to Lindane, DDT, other synthetic insecticides.

FOAM-BATH—For cats and dogs. All-weather dry bath contains lanolin and other essential oils to help prevent dryness of skin and coat.

DEODORANT BOMB—For Dogs. Bacteriostatic and fungistatic action attacks bacteria-produced odors; doesn't merely mask them. Refreshing fragrance.

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or write direct to Whitmire

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precision and performance

BARD-PARKER
RIB-BACK
SURGICAL BLADES

BARD-PARKER RIB-BACK SURGICAL BLADES are preferred by the Profession . . . because they know that each blade, through continuous inspection—meets every specification.

And, there are other traditionally good reasons why there is a preference for B-P RIB-BACK SURGICAL BLADES . . . they are *always* dependable and highly economical in performance.

Ask your dealer
BARD-PARKER COMPANY, INC.
Danbury Connecticut, U.S.A.

MEETING CALENDAR

American Animal Hospital Association. Annual Meeting. Palace Hotel, San Francisco, Calif., May 8-11, 1957. W. H. Riser, 5335 Touhy Ave., Skokie, Ill., executive secretary.

Eastern Iowa Veterinary Association. Twenty-third Annual All-day Practitioner's Clinic. Hawkeye Downs, Cedar Rapids, Ia., May 14, 197. Dr. F. E. Brutsman, Traer, Ia., secretary.

Kansas State College. Nineteenth Annual Conference for Veterinarians. School of Veterinary Medicine, Manhattan, Kans., May 26-28, 1957. E. E. Leasure, dean.

School of Veterinary Medicine, Texas A. & M. College. Tenth Annual Texas Conference for Veterinarians. College Station, Texas, June 6-7, 1957. R. D. Turk, conference chairman.

Vermont Veterinary Medical Association. Summer Conference. The Lodge at Smugglers Notch, Stowe, Vt., June 18-19, 1957. Dr. A. E. Janawicz, Department of Agriculture, Montpelier, secretary.

Georgia Veterinary Medical Association. Fifty-first Annual Meeting. Georgia Continuing Educational Center, Athens, Ga., June 23-25, 1957. Dr. Chas. C. Rife, secretary.

North Carolina State Veterinary Examining Board. General Meeting. Grove Park Inn, Asheville, N. C., June 24-26, 1957. Dr. James I. Cornwell, 65 Beverly Road, Asheville, N. C., secretary.

Maritime Veterinary Associations Joint Conference. Mount Allison University, Sackville, New Brunswick, June 25-27. Dr. J. F. Frank, Sackville, chairman, Joint Committee.

Michigan State Veterinary Medical Association. Annual Meeting. Leland Hotel, Detroit, Mich., June 26-27, 1957. Dr. Paul V. Howard, 4011 Hunsberger N. E., Grand Rapids 5, Mich.

Maryland State Veterinary Medical Association. Summer Meeting. George Washington Hotel, Ocean City, Md., June 27-28. John D. Gadd, Cockeysville, Md., secretary-treasurer.

Kentucky Veterinary Medical Association. Forty-sixth Annual Meeting. The Brown Hotel, Louisville, Ky., July 15-16, 1957. Dr. Robert H. Singer, 136 Shawnee Place, Lexington, Ky., secretary.

Iowa State College. Annual Conference for Veterinarians. Memorial Union, Iowa State College campus, July 16-17, 1957. M. S. Hofstad, program chairman.

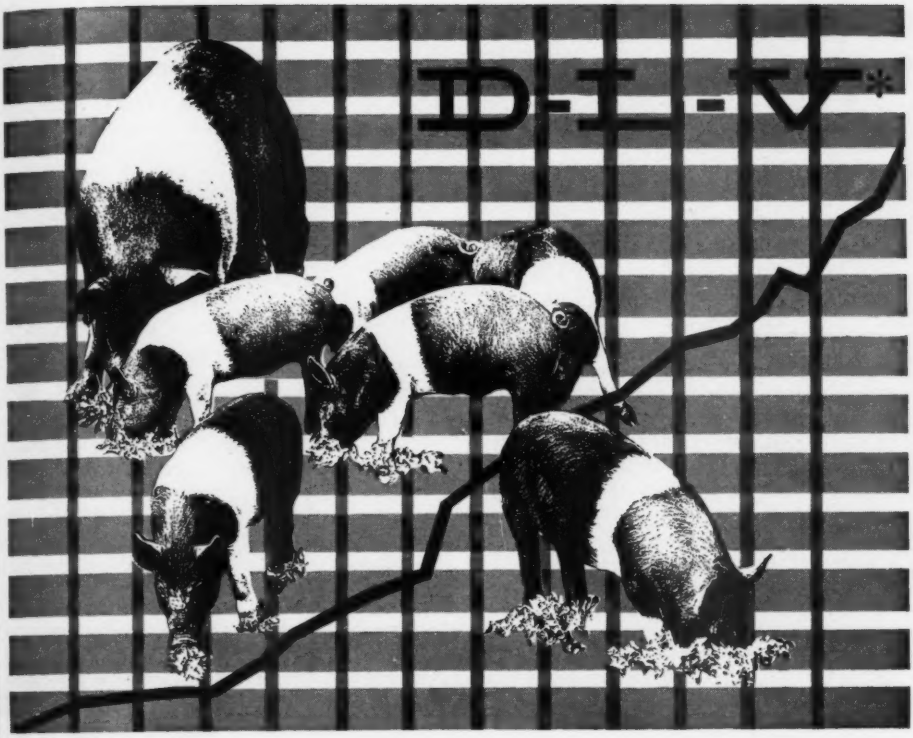
California State Veterinary Medical Association. Sixty-ninth Annual Convention. Hotel Miramar, Santa Barbara, June 17-19, 1957. Charles S. Travers, 300 16th St., San Francisco, executive secretary.

Alabama Polytechnic Institute. Fiftieth Annual Conference for Veterinarians. Auburn, Ala., July 21-26, 1957. Dr. R. S. Sugg, dean.

Canadian Veterinary Medical Association. Ninth Annual Meeting. Hotel Georgia, Vancouver, B.C., July 22-24, 1957. Dr. J. Archibald, Ontario Veterinary College, Guelph, Ontario, vice-president.

New York State Veterinary Medical Society. Annual Meeting. Hotel Statler, Buffalo, N. Y., Sept. 11-13, 1957. Joan S. Halat, 803 Varick St., Utica, N. Y., secretary.

New England Veterinary Medical Association. Twenty-third Annual Meeting. Equinax House, Manchester, Vermont, Oct. 6-9, 1957. Dr. C. Lawrence Blakely, 180 Longwood Ave., Boston, Mass., secretary.



Nothing succeeds like ...SUCCESS

This age-old French proverb accurately describes the increased acceptance of Diamond Laboratories' D-L-V porcine origin, modified live virus hog cholera vaccine. The high percentage of 1956 D-L-V sales indicate that veterinarians are using more and more D-L-V every day.

Added care and precautions in the production of D-L-V is largely responsible for the outstanding performance delivered in the vaccination of millions of swine.

A standard dose (2cc D-L-V with 10cc serum) produces solid immunity and erases the possibility of spreading hog cholera. D-L-V is made available in 2-5-10-20 and 50 dose vials.

*Diamond Laboratories Vaccine

Exclusively Owned By Practicing Veterinarians

DIAMOND LABORATORIES
DES MOINES, IOWA

DEODORANT
DAIRMOL
ANTISEPTIC

FOR SKIN & ACCESSIBLE MUCOUS MEMBRANES
OF ALL DOMESTIC ANIMALS

Also excellent for care of hands and instruments—
Non-caustic. Non-irritating.
Recommended for lubricating hands and arms; deodorizing and soothing qualities particularly desirable in removing retained placenta, etc.
Dairmol cleanses, retains cutting edge of instruments without corrosion.

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Health agencies in some major cities, Philadelphia as one example, report having made necessary arrangements to inspect *x*-ray equipment employed by veterinarians, for safety whenever such inspection is requested by the practitioner. This is being done to assure against dangers of defective equipment to operators, patients, and clients who may be exposed to excessive radiation.

▼ ▼ ▼

EXAMINATIONS

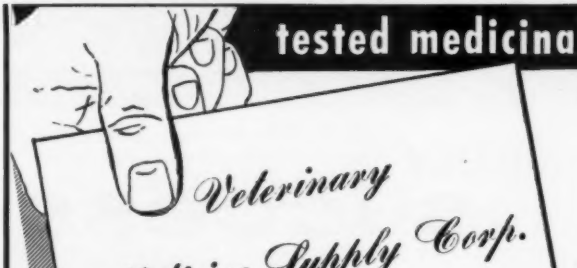
Massachusetts Examination
June 27-29, 1957

The Massachusetts Board of Registration in Veterinary Medicine will hold examinations for registration at Amherst, June 27-29, 1957. All applications must be filed by June 20. Inquiries should be addressed to Dr. Ray S. Youmans, secretary, Board of Registration in Veterinary Medicine, Room 33, State House, Boston, Mass.

▼ ▼ ▼

Missouri Veterinary Examination
May 27-28, 1957

The Missouri Veterinary Examination will be held May 27-28, 1957, at the Veterinary Clinic, University of Missouri, Columbia. Veterinarians interested in taking the examination may secure application blanks from the Board Chairman, Dr. L. A. Rosner, P.O. Box 630, Jefferson City. Application blanks may be secured in advance of the scheduled examination.



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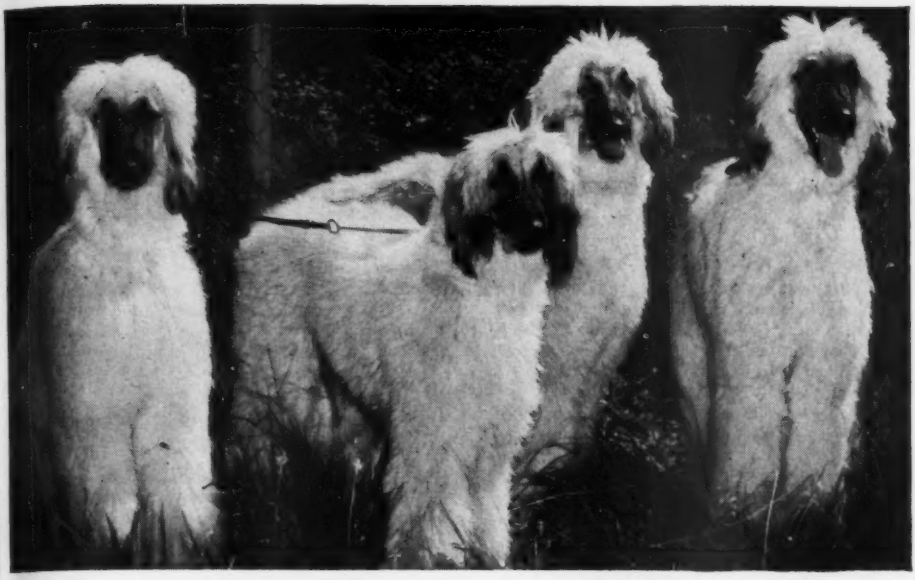

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Great Dane	English Springer Spaniel
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SEND FOR FREE INFORMATION

The dry self-feeding tests are continuing at the Gaines Research Kennels, opening up a new phase in dog feeding methods. If you are interested in knowing more about the self-feeding method, Gaines will be pleased to send you without obligation a report on the tests as well as information about types of feeders. Just write to Gaines Research Kennels, Box 164, Dept. A, Kankakee, Ill.

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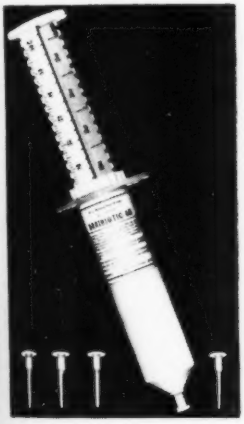
in the "dial-a-dose" syringe



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Methapyrilene HCl . . . . . in a free-flowing, milk miscible base	200 mg.

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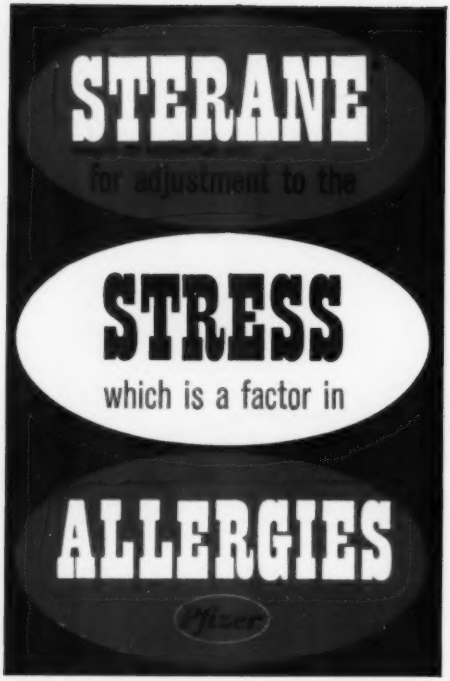

—DEATHS OF VETERINARIANS—

Ralph Van Loon Beard, Burlington, Iowa, KSC '18, Feb. 27, 1957.

John F. Chipman, Orlando, Fla., KCV '14, Dec. 9, 1956.

W. L. Coplin, Jackson, Tenn., died June 29, 1956.

F. F. Eckert, Lancaster, Wisc., CVC '02, Nov. 15, 1956.

P. W. Flickinger, Greenfield, Ia., MCK '06, Nov. 17, 1956.

Franklin L. Foster, Pico, Calif., COR '06, Oct. 13, 1956.

Walter A. Hahn, Geneva, Ill., CVC '16, Dec. 25, 1956.

George B McKillip, Evanston, Ill., MCK '08, Jan. 30, 1957.

Paul A. Mollan, Libertyville, Ill., CVC '07, Jan. 1, 1957.

Glenn I. Luymes, Galva, Ill., ISC '50, Dec. 20, 1956.

Charles E. Morgan, Toronto, Ont., ONT '17, Nov. 17, 1956.

O. Sandin, Plattsmouth, Nebr., KCV '12, Dec. 31, 1956.

Maurice A. Quinn, Norwich, N. Y., NYS '16, Oct. 10, 1956.

Hubert F. Ronnenberg, Houston, Minn., IND '15, Nov. 13, 1956.

Clifford C. Sockman, Deshler, Ohio, OSU '06, Nov. 10, 1956.

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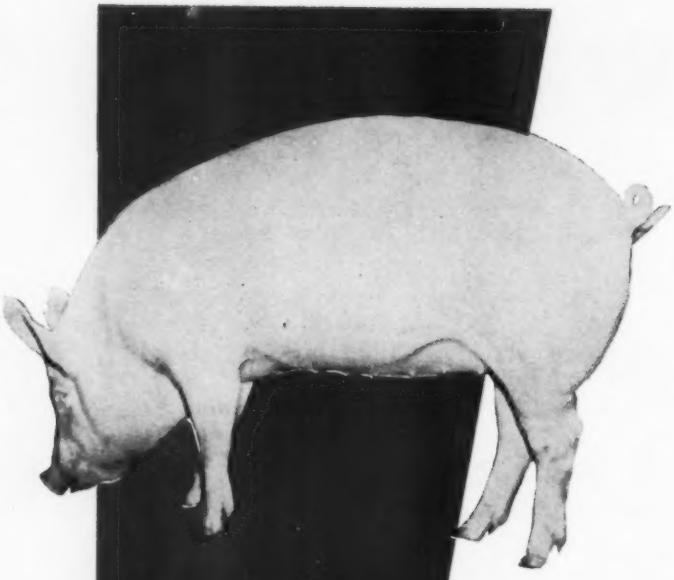

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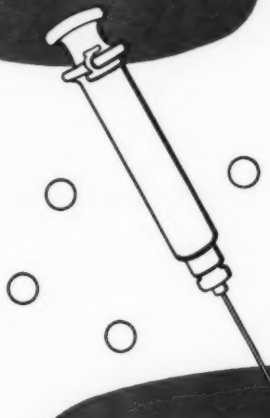

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